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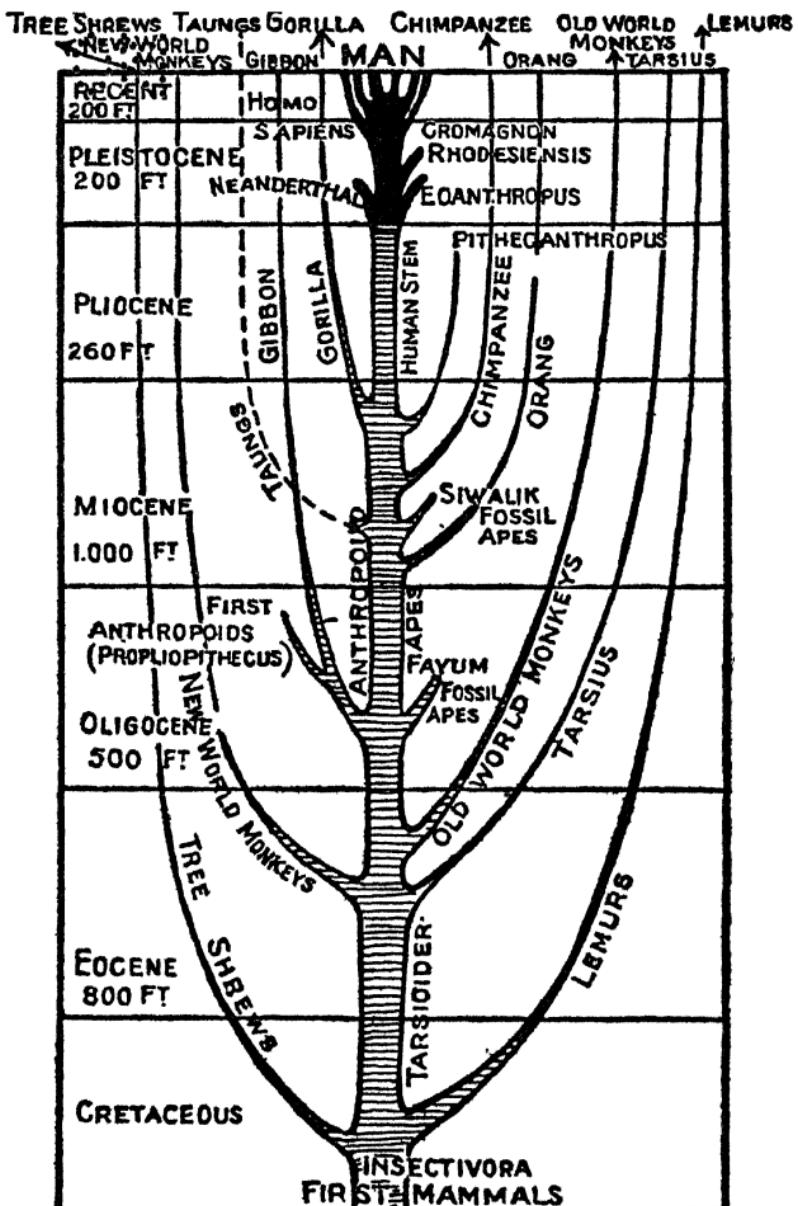
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THE BEGINNINGS OF MAN



GENEALOGICAL TREE SHOWING THE ANCESTRY OF MAN

THE BEGINNINGS OF MAN

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TO
MY MOTHER

P R E F A C E

CERTAIN subjects seem to arouse public interest at recurrent intervals, and of these the scientific hypothesis of evolution in its relation to human origins is among the most conspicuous. Therefore a presidential address to the British Association dealing with the present position of Darwin's theory of the Descent of Man is calculated to produce "no small stir," especially when the occupant of the chair happens to be so eminent an authority as Sir Arthur Keith. Since Darwin formulated the theory of "The Origin of Species by Means of Natural Selection," and its corollary "The Descent of Man" from a mammalian stock, so much confirmatory evidence had been forthcoming that to-day the hypothesis, as a general principle, has become a statement of historical fact. But, while the main conclusion is conceded by all scientists, and by most educated and well-informed persons, the

controversy that followed the last meeting of the British Association (1927) revealed a marked divergence of opinion regarding the cause of the *modus operandi* of human evolution, and the relation of the scientific evidence to a philosophical and theological synthesis.

As an anthropologist who is convinced that man cannot be explained merely in terms of mechanism, the editor asked me to write this volume for the "People's Library" describing the Beginnings of Man in language free from technicalities. My belief is that it is possible to lay stress on emergent factors in evolution without denying resultant effects, and while objections to the Darwinian hypothesis raised on grounds of sentimentality and "Fundamentalism" can be dismissed without serious consideration, a scientific study of human origins cannot afford to disregard forces, factors, and influences outside the sphere of purely physical processes. The materialistic schema of Nineteenth Century science has broken down, and the old foundations of scientific thought are now almost

as obsolete as the Semitic conception of the universe. Time and space, matter and mechanism, structure and function, all require reinterpretation, and as Professor Whitehead has asked, "What is the use of talking about a mechanical explanation when you do not know what you mean by mechanics?" Yet there is a danger of the scientist allowing his view of structure to degenerate into just mechanism, while the philosopher and theologian are liable to become absorbed in mere abstractions. My aim in these pages has been to attempt a correlation of the anthropological evidence with values and realities outside the dominion of scientific method, and so I have tried to review the beginnings of man, both as a product of mammalian evolution and as a "human personality," without doing violence either to facts or faith. The greater part of the book consists of a summary of the scientific data in the light of the most recent research, the concluding chapters being devoted to a discussion of processes, values, and purposes. For the benefit of readers unfamiliar with the subject, a short

glossary of technical terms is added, while at the end of each chapter a short bibliography will be found as a guide to further study.

In these lists are most of the books consulted in the preparation of the MS., but in the absence of documentation it has not been possible to indicate in the text my indebtedness to other writers. Special mention, however, must be made of the kindness of my friend Mr. J. Reid Moir, who has given me the benefit of his expert knowledge of the traces of our earliest ancestors, and two other friends, the Rev. A. Mallinson and Mr. S. Cook, have again helped me in proof-reading. My long-suffering wife and constant companion in archæological travel, with her usual ability and generosity, has undertaken to see the volume through the press. Finally, the dedication expresses a debt of filial affection which one owes to her through whom, in the natural order, one takes one's beginning.

E. O. JAMES.

*Oxford,
January, 1928.*

GLOSSARY OF ARCHÆOLOGICAL TERMS

- Achen*, a temporary retreat of the ice while the last glaciation was diminishing in extent.
- Acheulean*, the flint culture recognized at St. Acheul, which probably prevailed at the approach of the last glaciation.
- Aurignacian*, the first stage of the culture of the modern type of man, occurring during the Achen retreat, and characterized by flint, bone, and horn industries, and the earliest attempts at engraving, sculpture, and painting.
- Azilian*, a transitional culture belonging to the phase immediately succeeding the close of the Palæolithic period, and deriving its name from the type station, Mas d'Azil, Ariège.
- Bühl*, a temporary glaciation during the last retreat of the ice.
- Capsian*, a flint culture in North Africa analogous in many respects to the Aurignacian in Europe.
- Chellean*, the earliest division of the Palæolithic Period, according to the original classification, and belonging to the Mindel-Riss or possibly the Günz-Mindel interglaciations. Type station is at Chelles-sur-Marne.
- Coup-de-poing*, a pointed hand axe typical of the Chellean culture.
- Crô-Magnon*, an important sub-group of the earliest representatives of the modern type of man.
- Drift*, the glacial gravel deposit carried along by rivers after a general thaw following a glaciation.
- Eoanthropus*, or "the dawn man," is the name given to the Piltdown remains, because of their great antiquity.
- Eocene*, the first period of the Tertiary Age, during which mammals evolved and ancestors of the horse and elephant appeared.
- Eoliths*, or "dawn stones," consisting of pieces of chipped gravel, thought by many archæologists to represent the earliest human tools.
- Glacial Period*, the epoch during which the Northern Hemisphere was in great measure covered with ice sheets intermittently. The advances (usually numbered at four) are known as *glaciations*, while the warm intervals during the retreat of the glaciers are called *interglacial phases*.
- Günz*, the first glaciation in Palæolithic times (cf. Glacial Period).
- Günz-Mindel*, the first interglacial phase.

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Homo Heidelbergensis, a very early type of man, with brutish appearance, living in the first or second interglaciation in the neighbourhood of Heidelberg.

Homo Neanderthalensis, the very primitive race inhabiting the caves during and before the Würm glaciation. The type derives its name from Neanderthal, and was probably contemporaneous with the Mousterian flint industry.

Homo sapiens, the modern variety of man, and apparently distinct from the Neanderthal and other earlier types.

Loess, a deposit of fine yellowish-gray or brown sandy loam laid down during the cold seasons at the beginning or end of a glaciation.

Magdalenian, the last stage of the Old Stone Age, characterized by long, narrow flake implements, tools in bone and horn, carving in ivory, and the highest developments of cave art.

Microliths, minute flakes carefully trimmed, sometimes called "pygmy flints."

Mindel, the second of the glacial advances.

Mindel-Riss, the second interglacial phase.

Miocene, the third period of the Tertiary Era, in which the anthropoid ancestors of the gorilla, chimpanzee, orang, and gibbon, and possibly man, diverged from the common stem.

Mousterian, the flint industry of flake tools that prevailed during the first cave period, contemporaneous with Neanderthal man.

Neolithic, the later or New Stone Age, which followed the transitional cultures, and characterized by the beginning of agriculture, domestication of animals, and other arts and crafts.

Oligocene, the second period of the Tertiary Age, in which probably the human ancestor was in process of emergence.

Palæolithic Period, or Old Stone Age, during which man lived by hunting.

Pithecanthropus, an ape-like creature from Java having certain definitely human features.

Pleistocene, the fourth or Quaternary Geological Age, contemporary with the Glacial and Palæolithic Periods.

Pliocene, the last period of the Tertiary Age, in which the higher mammals and probably man became established in a warm climate before the onset of the Ice Age.

Pre-Palæolithic, the earliest division of the Old Stone Age prior to the Chellean culture, and extending back into the Pliocene.

Pygmy flints. See Microlithic.

Rostro-carinates, flints shaped like the beak of an eagle found in pre-Palæolithic deposits, and thought to be of human origin.

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Scrapers, flat-backed flint implements, probably used for scraping skins, etc.

Solutrean, a highly developed flint industry characterized by magnificent leaf-shaped blades, deriving its name from Solutré and making its way in Central Europe at the end of the Aurignacian culture. Probably it came from the East.

Tardenoisean, a microlithic transitional culture applied to the Azilian, and having affinities with Capsian types.

Terrace gravels, a deposit of gravel left along the sides of the valley after a general thaw at the end of a glaciation.

Transitional cultures, sometimes called "epipalæolithic," occurring between the Palæolithic and Neolithic, during which man lived chiefly by food-gathering and on shell fish.

Würm, the fourth and last complete glaciation.

THE GEOLOGICAL DIVISIONS OF THE EARTH, AND THE SEQUENCE OF
HUMAN CULTURES

| Geological Age | Sub-Periods | Dominant Forms of Life |
|--------------------------------|--|---|
| Primeval Era (length unknown). | Beginning of the atmosphere and cooling of the earth. Formation of rocks. Archæan. | Sponges, corals, protozoa, "worms." Invertebrates and earliest vertebrates. Sea scorpions, fish with jaws. True fish, turf and tree ferns. Forests, amphibia, insects. Archaic forms of reptiles. |
| Primary, or Palæozoic Age. | Cambrian. Ordovician. Silurian. Devonian. Carboniferous. Permian. | Reptiles and amphibia. Giant reptiles (dinosaurs), fish, archaic birds, crocodiles. Modern fish, flowering plants, monstrous reptile forms. |
| Secondary or Mesozoic Age. | Triassic. Jurassic. Cretaceous. | Archaic mammals, ancestor of horse and elephant. Tarsioids. Mesohippus, mastodon, dog, and cat forms. Human ancestor, and fossil monkeys. <i>Propliopithecus</i> . Anthropoid ancestors of gorilla, chimpanzee, orang, and gibbon. <i>Dryopithecus</i> . Ancestral forms of all living animals, <i>Palæopithecus</i> , <i>Pithecanthropus</i> , and probably man. Cf. Eoliths. |
| Tertiary, or Cainozoic Age. | Eocene. Oligocene. Miocene. Pliocene. | |

| PLEISTOCENE PERIOD | | | |
|--------------------------------------|---|---|--|
| | HUMAN CULTURES | GLACIAL PHASES | HUMAN TYPES |
| Quaternary Age. | Pre-Chellean. Pre-Chellean ({}). Chellean. Acheulean and Lower Monsterian. Upper Monsterian. Aurignacian. Solutrean. Magdalenian. | Günz. Günz-Mindel Mindel. Mindel-Riss Riss Riss-Würm. Würm. Achen. Bühl. I. Bühl. II. III. | (?) <i>Eoanthropus</i> . Red Crag. <i>Homo Heidelbergensis</i> (?). <i>Homo Heidelbergensis</i> (?). <i>Homo Neanderthalensis</i> . |
| TRANSITIONAL (EPIPALÆOLITHIC) PERIOD | | | |
| | Final Capsian, and Early Azilian. Late Azilian, and Tardenoisean. Asturian. Maglemosean. Campignian. Shell Mounds. | Bühl. III. Bühl. III. Gschitz. Daun. | Forerunners of modern races. |
| NEOLITHIC PERIOD | | | |
| Recent. | | | Neolithic agricultural civilizations and dawn of Alpine, Nordic, and Mediterranean races in third millennium B. c. |

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THE BEGINNINGS OF MAN

Chapter I EARLY TYPES OF MAN

THE beginnings of man! There are few pursuits more fascinating than to try and find out the history of an object and discover how it has been made. Small wonder, then, that the origin of a complex construction like man is a subject of perennial interest, calling forth both the profoundest thought and the wildest speculations of which the human mind is capable. Moreover, the attempt to solve the problem by deep reasoning and mythological speculation has generally coincided in the more advanced communities, the one not infrequently reacting on the other, especially when the legendary or allegorical traditions have a religious sanction. Thus a vice chancellor of the University of Cambridge once asserted

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that man was created on October 25, 4004 B.C., at nine o'clock in the morning, an interesting piece of information which he derived from a literal interpretation of the poetic descriptions of creation in the opening chapters of Genesis. Now, as we shall have occasion to show later on, these narratives are by no means without real and religious value, but to regard them as statements of historic fact is to mistake their purpose and meaning. However, in Dr. John Lightfoot's day, the scientific study of man had not revealed the vast antiquity of the human race and the circumstances which probably attended its emergence any more than theological research had then made clear the true significance of the sacred Scriptures in relation to historical situations. But now we know that to understand human nature properly we must take an all-round view of it, both science and religion having their distinctive contributions to make in unravelling the mystery of man. If we are wise, we look to science to ascertain the facts concerning the early developments and ancestry of our race, leaving to the philosopher and

the theologian the task of interpreting them in terms of higher realities. But it has taken a long time for this to sink into our minds, and even yet there are some who confuse the two methods of approach to the problem. Scientists are still inclined to think exclusively in mechanisms, and religiously minded people in special creations, forgetting that man is both an organism and a human being.

From the days of the Greek philosophers, the various species which go to make up the world of nature were thought to have been derived from other species by some unknown law. This too was St. Augustine's view, creation for him being a process of development through the powers imparted to matter by the Creator, the bodily structure of man himself being according to this plan, and therefore the product of this nature of growth. He rejected the notion of creation having taken place in a week of six days, in favour of a gradual development by casual energy and potency, perfected forms eventually emerging after the waters and the earth had produced living things of a lower

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order. Moreover, he held that "it is very disgraceful and mischievous and of all things to be carefully avoided" that a Christian should speak of "some question of the earth or the sky, or the other elements of this world respecting which one who is not a Christian has knowledge derived from most certain reasoning or observation," as "being according to the Christian Scriptures."

This advice seems to have been followed by the subsequent leaders of the Church in the Early Middle Ages, the first to attempt a philosophical explanation of creation being Johannes Scotus Erigena, who tried to bring the Genesis stories into relation with Neo-Platonic theories. The Scholastics, however, paid little attention to the subject, although St. Thomas Aquinas discussed it at length, admitting, like Anselm before him, that there is room for differences about the six days. Then came the Reformation, and with it a new insistence on the mechanical verbal inspiration of the Bible, which reacted at once on the interpretation of the Genesis narratives. Thus Luther maintained that "Moses is writing history and

reporting things that actually happened," while Calvin asserted that "God was pleased that a history of the creation should exist." It was under the influence of this Protestant literalism that *Paradise Lost* was written, and the doctrine of special creation and the fixity of species became one of the chief tenets of post-Reformation theology.

Vestigial Organs—The dogma; however, had no sooner become established than certain facts appeared which seemed to suggest that the earlier view was, after all, nearer the truth. Contemporary with the great botanist Linnæus, who supported the doctrine, lived Georges Louis Leclerc, Comte de Buffon. Like Linnæus, he attacked the subject from the hypothesis that species were endowed by the Creator with certain fixed characteristics, but examination of the anatomical evidence revealed the presence of rudimentary organs of little or no purpose. Each organism therefore seemed to be a combination of other organisms, not excluding man. Thus it is now known that in the human body there are more than a hundred of these vestigial structures, of which the

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muscles enabling some people to move their ears, the conical point sometimes seen on the margin of the ear trumpet, or pinna, corresponding to the tip of the pointed ear of rabbits and other lower mammals, or the four imperfectly formed vertebræ at the end of the backbone, representing the remains of the tail on other animals, and finally the notorious vermiform appendix, may be quoted as examples. In the gorilla and the orang-utan this *cul de sac* at the junction of the small and large intestines is very much longer than in man, and in monkeys it is a blunt, conical point. In some animals, like the rabbit, the blind gut is the largest organ in the body, and comes to an end in the appendix. The lemurs, on the other hand, have a true appendix like that in the human body.

If man were a separate and independent creation these survivals would be quite inexplicable, and they could only be regarded as blemishes and blunders, but as the remains of earlier structures, useful in a former mode of existence, they are understandable and of great historical interest,

like the two buttons on the back of the waist of a frock coat, originally employed for fastening up the tails when riding horseback, or the shortened cassock of "apron" still worn by bishops, notwithstanding the fact that a car has long since replaced the episcopal horse in diocesan visitations. But knowing that the eyes of the Sorbonne were upon him, Buffon went no farther than to hint at a possible ancestor of the horse and ass, and of the ape and man, carefully adding the saving clause "of course the thing cannot be" since the Bible affirms the contrary.

Embryology—In 1827 Von Baer published an account of the development of the chick, and, continuing his research, he was able to show the marked resemblance between the early embryos of the vertebrates. In the course of development the fish-like qualities, such as the gill clefts, of the embryo destined to become a bird disappear, and unmistakable avian characteristics become prominent. It is, of course, now an established fact that before birth a baby passes through all the principal stages in the evolution of man, from the unicellular

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organism or egg cell, through the fish and reptile order, to that of the higher mammals. The body is covered with hair until three months before birth, and the rudimentary tail or "coccyx" is very prominent and movable. On the sides of the neck there are four pairs of slits corresponding to the gill clefts which enable fish and amphibia to breathe in water. Even after birth an infant is able to hang on to a stick just as a monkey supports itself by clasping the branch of a tree. There is, however, a very important consideration to bear in mind in this connection, and one which is frequently forgotten in stating this well-known evidence. It is only with *embryos* of these species, and not with the actual animals, that a comparison is possible; and, moreover, throughout the development the human embryo retains an individuality of its own. Sometimes babies are born in an imperfect state of growth, but they are nevertheless always human beings, however much they may reveal in their features and ways an earlier stage of evolution.

✓ *The "Origin of Species"*—It was while

people were thinking hard about these new revelations that Charles Darwin published his famous *Origin of Species* in 1859, in which he summarized the evidence in favour of interpreting creation in terms of evolution and enunciated the principle of natural selection to explain the changes that occurred. But although he proved his main theory by a vast store of facts, so strenuous was the opposition to the hypothesis that he speaks of it being "like confessing to a murder" to acknowledge the theory of evolution. This is to be accounted for by the fact that the pride as well as the religious thought of the Victorian Era had received a nasty jar. True, it was not till twelve years later that Darwin applied the hypothesis to the origin of man, but the implication was obvious from the beginning, and the self-satisfied and highly respectable Nineteenth Century did not wish to be reminded of its mammalian ancestry.

The Records of the Rocks—Nevertheless, nothing daunted, the pioneers continued their investigations, and gradually established their position. New facts poured in

from every field where the theory could be tested; so that to-day the general principle of evolution, or descent by modification, has been substantiated beyond any possibility of doubt, the "horrible paradoxes of one generation" having become "the common-places of schoolboys"; and the "startling proposition of 1860, a fact that no rational man can dispute." The sedimentary rocks have given up their secret in great measure, yielding the fossiline remains of the creatures and vegetations embedded in them. By the aid of these "rock records" the history of the earth from the earliest times has been traced with remarkable accuracy, the whole being divided into five "ages," of which the first two are called the Primary or Palæozoic, and the Secondary or Mesozoic (*i.e.*, the Middle ages). The third is known as the Tertiary or Cainozoic, and the next the Quaternary or Pleistocene. It was during the last two of these eras that man and his precursors appeared, although exactly at what point the human race emerged has not yet been finally determined.

Flint Implements—So long as man was believed to have come upon the scene quite suddenly as the last of a series of special creations, there was little room for scientific research in the matter of his origin and early history. Nevertheless, as long ago as 1839 Boucher de Perthes was extracting from the gravel beds of the Somme quantities of flint tools associated with the remains of extinct animals. This was not the first time, however, that implements of this nature had been found, for toward the end of the Seventeenth Century a fine pear-shaped artefact came to light, with the tooth of an extinct elephant, opposite to Black Mary's, near Gray's Inn Lane, London. It was then described as a British weapon and put in the Sloane Collection as such, just as the Neolithic implements found in Italy were in those days labelled as "thunderbolts," an explanation of stone axes given by writers such as Gesner and Agricola in the Middle Ages. The flint arrowheads which were picked up from time to time on ploughed fields were frequently regarded by

the peasants as the weapons of a mythological race supposed to have inhabited the earth in former days.

But even before geologists and archæologists set to work to give a rational and scientific interpretation of these finds, several people acquainted with native customs suggested that the so-called "thunder stones" were really human implements comparable to the flint tools in use among people still living in a primitive state of culture. Mercati, a physician to Clement VIII at the end of the Sixteenth Century, appears to have been the first to assign them to a people unacquainted with bronze and iron, although their true significance was not generally recognized until the Nineteenth Century. In 1797 John Frere found numerous examples of prehistoric implements at a depth of about twelve feet in some clay pits at Hoxne, in Suffolk, and referred them to a "very remote period indeed, even beyond that of the present world, and to a people who had not the use of metal."

This important pronouncement does not seem to have attracted any interest or raised

any discussion, probably because it preceded by half a century the publication of the *Origin of Species*. It was not until after Sir John Evans had inspected Boucher de Perthes's collection at Amiens and Abbéville, and the gravels in which they were found, that the antiquity of Frere's flints was eventually proved. In the meantime, however, a commission had been appointed (1806) to make a scientific investigation into the natural history and geology of Denmark, and this brought to light the huge shell mounds along the coast, abounding in stone implements. These were housed in what became in 1816 the Royal Danish Museum of Antiquities at Copenhagen, and there the curator, Mr. C. J. Thomson, arranged and classified the collections, establishing for the first time the sequence of the Stone, Bronze, and Iron Ages.*

While this work was going on in Denmark, the Roman Catholic chaplain at Tor Abbey, the Rev. J. MacEnery, explored the well-known Kent's Cavern at Torquay, and

* The classification had been suggested before, but this was the first attempt to arrange a museum in this order.

to him fell the distinction of discovering the first flint implement found in unmistakable association with extinct animal remains. Doctor Buckland, who was the chief authority on bone caves at the time, visited the site, and the only explanation of the occurrence he could give was that the ancient Britons had made ovens in the stalagmite, through which the flints had reached their position! Other similar finds should have confirmed MacEnery's discovery, but, as Pengelly, one of the explorers, pointed out, "the scientific world told us that our statements were impossible, and we simply responded with the remark that we had not said that they were possible, only that they were true." Thirty years later, however, he succeeded in convincing his opponents, when in 1858 he recovered flint implements from another cave on the shores of Torbay—at Brixham—in association with the remains of hyænas, cave bears, mammoth, and woolly rhinoceros, beneath an undisturbed layer of red loam under stalagmite. This clinched the argument, and converted such authorities as Lyell, Prestwich, and Owen, just as

Boucher de Perthes's researches on the Somme carried conviction to the French archæologists about the same time.

Human Bones at Neanderthal—In 1856 a strange skeleton was unearthed by some workmen in a cave at the entrance to a small ravine called the Neanderthal, at Düsseldorf, on the right bank of the Düssel, which, like the implements, evoked a lively controversy. Some thought the brutal-looking remains could not have belonged to any ordinary human being, and so they explained them as the skeleton of a diseased person or an idiot, while others thought they were distorted by age. Shaafhausen of Bonn, however, maintained that it was "the most ancient memorial of the early inhabitants of Europe," an opinion supported by Huxley. In 1863, four years after the publication of the *Origin of Species*, Lyell showed that the ape-like character of the skeleton supported Lamarck's doctrine of progressive development and transmutation, thereby preparing the way for a right understanding of the discoveries which were to follow.

The Glacial Period—In order to get these contentious bones into their proper historical place, it is necessary to digress for a moment, and turn our attention to another line of investigation which was beginning to engage the thoughts of the pioneer students of early man. For some time geologists had been speculating about the possibility of a period of great cold having occurred before the period of recent life began, and the hypothesis was accepted by many experts after Louis Agassiz ably argued the case in his presidential address to the Société Helvétique in 1837, and in his subsequent book, *Études sur les glaciers* (1840). As the evidence increased it became apparent that the fall in temperature after the close of the Tertiary Era was not uniform over Northern and Central Europe, several glacial advances having been separated by warmer “interglaciations,” during which the ice partially disappeared, except in the Arctic regions. In 1854 Morlot postulated three glacial stages with two temperate interludes, but in 1871 and 1881 Geikie increased the glaciations to six. Subsequent

research has tended to show that the snow-line was lowered, and the valley glaciers were enlarged four times, with three interglacial phases between them. These four advances have been named after certain Alpine valleys in which the data was studied, and so are called the *Günz*, *Mindel*, *Riss*, and *Würm*. After the last or *Würm* glaciation, warmer conditions prevailed during the so-called *Achen* retreat, till the glaciers returned temporarily at the *Bühl* advance, before the present mean annual level of temperature was reached after the close of the Old Stone Age. The interglacial episodes which alternated with these glaciations are generally described by the terms *Günz-Mindel*, *Mindel-Riss*, and *Riss-Würm*.

To estimate these events in terms of years can only be in the nature of a guess, so slow were the variations in climate, and experts differ enormously in their chronology. Thus Penck requires nearly a million years for the whole Glacial Period, while Sollas is content with 400,000 years, Keith with 200,000, and Rutot with 140,000. But whatever the final verdict may be, it is now quite certain

that man inhabited Europe during the whole of this period, and probably before the ice appeared, Reid Moir maintaining that he has lived in East Anglia for at least 500,000 years. It is therefore hardly surprising that for a generation accustomed to think of the beginning of human history in terms of 4000 B.C., the testimony of the flint implements extracted from glacial gravels and human bones in association with animals like the mammoth was difficult to accept. Yet there were the tools, and if the skeleton was uncertain, the more the implements were studied in relation to the strata in which they occurred, the more convincing did the hypothesis become. So it came about that in 1853 Doctor Rigolot was converted at St. Acheul, near Amiens, and six years later Sir Joseph Prestwich and Sir John Evans accepted the flints as the works of early man.

The Stone Age—The authenticity of these finds having been established, Sir John Lubbock, afterward Lord Avebury, suggested the division of the Stone Age into the *Palæolithic* or Old Stone Age, to include the remains from the gravels and caves, while

the surface implements and those from rude stone tombs he assigned to the *Neolithic* or New Stone Age, which followed the final disappearance of the ice to the Arctic Circle. This later period was regarded as marking the beginning of agriculture, the domestication of animals, and other higher developments of culture; but the division now appears to be arbitrary in many ways, though it is still generally adopted as roughly corresponding to the distinction between ancient hunters and food collectors, and the earliest stages of food production. The Palæolithic Period has been since subdivided into cultural phases. These were estimated at five by Gabriel de Mortillet in 1869, as a result of the relative positions of flints in the strata. In descending order of antiquity the classification now adopted is as follows:

Magdalenian—Named from the type station at La Madeleine in the Dordogne, and characterized by long, narrow implements made from flakes, together with tools in bone and horn, carvings in ivory, and excellent cave paintings.

Solutrean—A highly developed flint industry producing magnificent leaf-shaped blades, deriving its

name from Solutré, near Mâcon, Saône-et-Loire. Probably the culture came from the East.

Aurignacian—The first stage of the culture of the modern type of man, comprising flint, bone, and horn industries and the earliest attempts at engraving and cave decoration. This phase, which occurred at the end of the Würm glaciation, when the Achen oscillation was taking place, was not recognized in Mortillet's original sequence.

Mousterian—The flint industry, composed almost entirely of flake implements and named after the rock shelter at Le Moustier in the Dordogne. It was the work of Neanderthal man during the Würm glaciation and probably in the preceding interglaciation, if not even earlier in the Riss.

Acheulean—The culture recognized at St. Acheul near Amiens, containing oval hand axes (*coup-de-poing*), triangular axes, and large flakes (*Levallois*). This phase probably occurred when the climate was cooling at the approach of the Würm glaciation.

Chellean—An earlier stage of the hand-axe culture was recognized at Chelles-sur-Marne, which is thought to belong either to the Mindel-Riss or possibly to the Günz-Mindel interglaciation.

This is as far as Mortillet went back in his classification, but a *pre-Palaeolithic* culture is now established as representing the earliest attempts at tool-making, some of which can almost certainly be traced back to the Pliocene Epoch in the Tertiary Geological Age. Some would advocate even

a Miocene date for the earliest "*eoliths*." At any rate there is a human culture preceding the Glacial Period, just as at the other end, between the Magdalenian and the Neolithic, there is an *Epipalæolithic* or transitional culture phase, divided into *Azilian-Tardenoisean*, *Asturian*, and *Maglemosean* cultures, when virile hunters had degenerated into mere collectors of food and eked out a miserable existence on shell-fish along the Danish coast, till the discovery of agriculture brought civilization into being between 7,000 and 10,000 years ago.

Homo Neanderthalensis—These are briefly the divisions of the Stone Age now determined, but, of course, our knowledge is much more complete to-day than it was when the scientific world was thinking hard and arguing fiercely about the flints in the Somme gravels, and the strange relic from the Neander ravine. In 1865 an important discovery was made which threw further light upon the problem, a lower human jaw being found in association with the remains of the mammoth, woolly rhinoceros, bear, and reindeer, fourteen feet below the surface

of the floor of a limestone cave called Trou de Naulette in the Ardennes of Eastern Belgium. The true significance of this chinless, heavy-built jaw, comparable to that of the Neanderthal skull and to a similar example found in 1848 at Forbes's Quarry, Gibraltar, was not fully realized till twenty years later, when a party from the neighbouring University of Liège recovered the skeletons of two men of the same type from a terrace in front of the Grotte de Spy, a cave on the eastern bank of a small tributary of the Meuse, eight miles from Namur. It now became clear that these human remains must belong to a definite prehistoric race—*Homo Neanderthalensis*—since with the bodies the same kind of tools were found as at La Naulette, together with the bones of the mammoth and the woolly rhinoceros.

The ball, having been set rolling, moved quickly. Caves in all parts of Western Europe, but especially in the department of France known as the Dordogne, revealed traces of their ancient inhabitants and their handiwork, so that to-day more than three hundred Neanderthal stations in Europe are

known to archæologists, two thirds of which are in France. Duly authenticated remains of this sturdily built race, with projecting brow ridges, massive jaws, large teeth, who walked apparently with a slouching gait, have been found in caves in such typical sites as Le Moustier, on the right bank of the Vézère, a tributary of the Garonne, where the limestone hills must have sheltered a comparatively dense population in the middle of the Palæolithic Period; while a few miles away, on the western side of the valley, a similar skeleton, buried with great care, has come to light at La Ferrassie. In this cave were also the remains of two children, Mousterian flint implements, and the bones of bison, reindeer, and the wild horse. An almost identical burial has been unearthed seventy miles to the east, in the department of Corrèze, lying in a pit in the centre of the passage of a small, low-roofed cave near the village of La Chapelle-aux-Saints. In the commune of Gardes, a Neanderthal station at La Quina has been carefully explored by Dr. Henri Martin, and found to contain the bones of no less than

sixteen or seventeen individuals, besides many important relics of their industry. With these remains the piece of a skull, discovered in 1926 during excavations in making the new Lloyd's buildings in Leaden-hall Street, London, has been compared, though the strata in which the London skull occurred seem to have been Aurignacian, and therefore rather later than the La Quina and other examples of Neanderthal man.

In Ariège, near the Pyrenees, a human jaw like that discovered at La Naulette occurred in a stalactite cave at Malarnaud in association with extinct animals characteristic of the period. Farther afield, at Krapina near Agram in Croatia, a large number of Neanderthal bones have come to light, one skull having cuts on the head which some think, but perhaps with insufficient reason, indicates that the people here practised cannibalism. But the diversity in type is more important than this guess, showing that while all the cave men seem to have had prominent eyebrow ridges (at least so far as the examples known to us at present are concerned), some had higher

foreheads and better-formed and less elongated heads than others. These examples from the east of Europe also reveal a special feature in the fusion of the roots of the teeth, and this peculiarity recurs in a Mousterian cave (La Cotte de St. Brelade) in Jersey. Similar teeth have been discovered recently in Ghar Dalam, Malta, which Keith thinks are Neanderthaloid, but as no other evidence of Palæolithic man occurs on the island the evidence is by no means convincing at present.

An interesting skull of Neanderthal type was dug out of the Broken Hill mine in Rhodesia in 1921, which appears to belong to a much later period, thus suggesting that the race survived in Africa long after it became extinct in Europe during the Würm glaciation. Another addition to our knowledge of *Homo Neanderthalensis* comes from the plain of Gennesaret in Galilee, where a skull with prominent brow ridges and receding forehead was discovered in 1926 in the Robbers' Cave, in association with Mousterian implements. Farther eastward a supposed human *sacrum* has been

found in Honan, China. Some archæologists, in fact, think that Neanderthal man evolved in North Asia, whence he made his way into Europe, and, after establishing himself in France, where he took shelter in the caves during the intense cold of the fourth glacial advance, finally migrated southward to Italy, and to Africa by Gibraltar, surviving for a long time in Rhodesia.

The Men of the River Drift—This, however, represents only one phase of early man. From the vast quantities of flint implements recovered by Boucher de Perthes and his successors from the gravels of the Somme, the scene of the recent military operations on the French front must have been a happy hunting ground in those far-off days when our Palæolithic ancestors fought for their lives with creatures stronger and muscularly mightier than themselves, and ultimately gained the supremacy. Unfortunately, none of their remains has been unearthed as yet in these deposits. To make the acquaintance of a representative of the widely scattered people who were responsible for the rough and heavy stone hand axes, generally called

by the French term *coup-de-poing*, and the flint scrapers, of the Chellean industry, we must proceed eastward to the charming university town of Heidelberg, between the Rhine and the Black Forest. There we shall find, in the University Museum, on the left-hand side of the main thoroughfare or *Hauptstrasse*, going in the direction of the castle, a human jaw of extraordinary size and shape. On examining the relic, the absence of a chin at once becomes apparent, and this, coupled with the massive proportions of the bones, gives it a thoroughly simian or ape-like appearance. It might have belonged to a gorilla, in fact, were it not for the teeth, which are quite as unmistakably human as those of an Australian aborigine. As in apes, it has a hollow on the lower part of the inner side of the jaw, in place of certain tubercles to which muscles of the tongue are attached in most human mandibles. This suggests that the individual could not move his tongue very freely, and therefore that he only had a rudimentary form of speech. The upward projection at the back of the jaw was very heavy and

square, as in the Neanderthal jaw bones, but not in those of a chimpanzee or of a modern man.

Let us now betake ourselves to the sand pit adjoining the village of Mauer, some six miles from Heidelberg, where the relic was found. A short walk from this not very thrilling little town—enlivened for the present writer when he visited it a few years ago only by the sight of a stork's nest on the chimney of the schoolhouse—brings us to a cart track on the right-hand side of the way, leading to the pit. The cutting has been made in strata produced by a river in the Ice Age, raised to a height of eighty-five feet above the bottom of the Elsenz Valley—a tributary of the Neckar—the floor now reaching nearly to the level of the bed of the present river. On the surface is a layer of a sandy deposit known as *loess*, laid down by windstorms during the cold seasons at the beginning and end of a glaciation. Probably a bed of loess was connected with each warm interlude, but only two, associated with the last return of the ice, have survived.

Of these the Older Loess was deposited just before, and the Upper or Younger Loess just after the fourth (Würm) glaciation. The first eighteen feet below the surface at the top of the Mauer pit is composed of Younger Loess, and beneath this is some seventeen feet of Older Loess, overlying the actual Mauer sands which form the rest (fifty-one feet) of the section. It was in this sand, laid down by the river at the beginning of the Pleistocene Period, that the bones of various extinct animals were found, such as the ancient elephant (*Elephas antiquus*), the Etruscan rhinoceros (*Rhinoceros etruscus*), and a little and a large bear (*Ursus avernensis* and *U. deningeri*), the forerunner of the cave bear (*U. spelæus*), and other species characteristic of a warm period at the beginning of the Ice Age. The Etruscan rhinoceros is more intimately connected with the earlier Pliocene, it is true, but the presence of *Elephas antiquus*, rather than the earlier *meridionalis*, shows that the sands are Pleistocene, having been laid down during the warm interval after either the first or

second glaciation (*i.e.*, in the Günz-Mindel, or the Mindel-Riss interlude). It was about this time that the Chellean industry flourished in Western Europe.

Hitherto the second or Mindel-Riss warm phase has been generally favoured for the date of the Chellean culture, but Mr. Reid Moir has now produced a good deal of evidence to show that, at any rate in East Anglia, the industry prevailed after the first retreat of the ice (Günz-Mindel), when the general thaw in the Rhine Valley laid down the deposit in England known as the Cromer Forest Bed.* In this stratum remains of early Pleistocene animals occur, such as *Elephas meridionalis*, *E. antiquus*, *E. primigenius*, together with the bison, deer, bear, and rhinoceros, while the implements embedded in this section of the Cromer cliffs are very large hand axes, scrapers, and various pointed tools resembling Chellean forms. Unfortunately, no human remains have been found in the forest beds, but if

* Until the end of the Palæolithic, England, of course, was joined to the Continent, an extension of the Rhine flowing into Norfolk.

the size of the implements is any guide, Mr. Reid Moir's Cromerians must have been hefty fellows.

Now it was about eighty feet below the surface that the Heidelberg jaw was recovered from the Mauer sands in 1907. Despite persistent search, except for a few fragments found by Professor Wardenberg, no traces of the rest of the skeleton have come to light, doubtless because it was washed in pieces higher up the stream (Elsenz), the jaw alone having been carried down to this spot. But we can give a very shrewd guess what the rest of the skull was like, for scientists now are able to fit together a skull from a few fragments with amazing accuracy. To put this to the test, a modern skull was taken and casts were made of it. It was then broken in pieces, and fragments were given to an expert to reconstruct, which he was able to do with remarkable results. A further illustration is afforded by the fact that when one of the teeth of the skull found at Piltdown turned up after the original reconstruction had been made, it fitted exactly into the socket prepared for it! On these lines the

cranium has been built up on the Mauer jaw, and it reveals a brutish-looking person with heavy features, having something of a snout and a protruding jaw—in fact, a very primitive type of *Homo Neanderthalensis*. This would accord with Mr. Reid Moir's Cromer Forest Bed conjecture, if the great implements found in these deposits were made by men of the Heidelberg type. It has also been suggested that two very ape-like molar teeth from Taubach near Weimar, in Germany, and a lower jaw from Ehringsdorf in the same district, belong to individuals who made Chellean tools and lived a roving life in the open in the temperate days at the beginning of the Glacial Period. If it was during the first interlude that *Homo Heidelbergensis* camped on the sunny banks of the pleasant German rivers, as Obermaier and Reid Moir think, it may have been close on half a million years ago that this industry flourished, and even on the more conservative estimate, probably several hundred thousand years have elapsed since the makers of these tools shuffled off their mortal coil.

and their remains were washed away with the "drift" of the rising rivers.

The Piltdown Skull—It was apparently about this time, at the very beginning of the Quarternary (Pleistocene) Age, that the famous individual lived whose remains have caused so much discussion since their discovery by Mr. Dawson in 1911–1912, in a thin stratum of gravel on the right side of an avenue leading from Piltdown Common to Barkman Manor in our own Sussex weald. Here some workmen, while raising gravel, came upon parts of a very thick and fossilized human cranium and gave them to Mr. Charles Dawson, a Lewes lawyer, who for many years had been studying the archæology of the district. Further search revealed half of a lower jawbone, a large canine tooth, and the remains of various extinct animals and some flint implements. It at once became apparent that this was no ordinary "find," for although the exact age of the deposit could not be determined, it was clearly Late Tertiary or Early Pleistocene, and the skull, while similar in form to a modern cranium, was composed of un-

usually heavy bones, the jaw being so primitive that it was thought by some to belong to a chimpanzee. Careful reconstructions were made, and although there has been much dispute about the precise proportions, it is now generally agreed that the capacity of the head is about 1300 c.c., the brain being definitely within the human range of variation, similar, in fact, to that of the Seventeenth Century female skulls in the Whitechapel plague pits, and better than the crania of such primitive people as the Australians. The jaw, on the other hand, is more ape-like than the Mauer relic, though the teeth are unmistakably human.

The bones occurred in a little patch of deep-yellow gravel, resting on a bed of yellow clay and sand covering the ancient wealden rock (the Hastings bed, as it is called geologically), in which were embedded hippopotamus teeth and the remains of the primitive horse, the mastodon, and stegodon, and what appears to be a tool made from the thigh bone of the gigantic *Elephas meridionalis*, or possibly *E. antiquus*. In the deep-yellow ferruginous gravel were rudely

shaped implements, worn by the action of water, while in the pale-yellow sandy loam were more finished artefacts. The human bones were found actually in the lowest stratum with the earlier type of flints and the remains of six animals, two of which could have lived in the Pliocene. This would appear to suggest a Pliocene antiquity for the Piltdown skull, were it not that, unlike the implements and animal remains, the human bones show no signs of the action of water. Therefore it seems probable that they really belong to the level of the unworn tools in the upper layer, and the later animals. Can it therefore be said that the Piltdown skull merits the title *Eoanthropus*—"the dawn man"—given to it by archæologists?

Unfortunately the gravel section cannot be accurately dated geologically, but the implements seem to be pre-Chellean in type, though not "eolithic," like those in the lowest level. Mr. Reid Moir, in fact, thinks that the unworn specimens are comparable to those he has found in East Anglia in pre-Crag deposits. This Red Crag is composed chiefly of shelly sand, and it is covered by

a deposit left by the ice of the subsequent glacial periods, which deposit contains blocks brought from the north by the ice. Below the Crag in Suffolk flints belonging to a definite type have been found, called by Sir Ray Lankester "rostro-carinates," because they resemble the beak of an eagle. Remarkable examples of another and later Crag "industry" from a pit at Foxhall, near Ipswich, seven feet below the top of the Red Crag, have been examined by the Abbé Breuil and M. Capitan, and pronounced of human workmanship. Moreover, Mr. Reid Moir has shown in a very convincing way how Chellean hand axes can be produced from rostro-carinates; thereby suggesting that the sub-Crag tools are ancestral forms of the later types. Now, of course, it follows from this that if the Piltdown unworn flints correspond to the East Anglian examples, they must be pre-Chellean, and, therefore, the human bones are older than the Mauer jaw. In this case, *Eoanthropus* is the oldest member of the human family known at present.

Eoliths—How long he will enjoy this dis-

tinction it is impossible to say, but, judging from the pre-Palæolithic implements that are coming to light, man was definitely established in Western Europe before the Glacial Period, the human race going back well into the Tertiary Era. Here, however, we enter upon a highly controversial subject, for since the Abbé Bourgeois first produced so-called "eoliths" or "dawn" stones from a very early deposit at Thenay (assigned to the Upper Oligocene Sub-period of the Tertiary Age), the humanity of the earliest attempts at tool-making has been a burning question in archæological circles. Clearly the first implements must have been very different from the finished articles of later times, for flint-flaking is both an art and a science. Originally stones shaped by natural forces doubtless sufficed, with perhaps a few additional chips to adapt them to the requirements of the moment. But however useful these articles may have been to the user, they become a tremendous problem for the archæologist, for who is to say whether a stone of this character is the work of nature or of man? Many experiments in

flint-flaking have been carried out in recent years, and although expert opinion is still divided, it is becoming recognized that some of the earlier types have been fashioned by human hands. To-day few competent scholars would deny that the Stone Age began with a pre-Palæolithic industry which probably goes back to Tertiary times. But the genuine dark-brown eolith found in considerable numbers in the gravels on the top of the North Downs is still of very disputed authenticity.

The best-known specimens are those collected and studied by the late Benjamin Harrison, who, until his lamented death in 1921, at the age of eighty-one, almost daily mounted the steep and wooded ascent to his hunting ground nearly five hundred feet above his little grocery stores in the picturesque Kentish village of Ightham. Anyone privileged to accompany him on his wanderings must be a strong-minded man if he returned unconvinced by some of the things he saw and the arguments put forth with all the ardour of an enthusiast, though he may have retracted somewhat as he reflected

on his homeward journey. Sir Joseph Prestwich, however, was permanently converted in 1889, and if Mr. Harrison was less successful with Sir John Evans, who, like Macalister and Hazzledine Warren, Sollas and Boule, in more recent times, steadfastly refused to accept the humanity of eoliths, many enthusiastic supporters, such as Ray Lankester, Reid Moir, and Rutot, have carried on his researches with such scientific method and persistent zeal that the general trend of the most recent research is to carry man back well into the Tertiary Era contemporary with these controversial stones.

Pithecanthropus—Nevertheless, it must be admitted that at present no convincing evidence exists of the actual remains of Tertiary man, unless, contrary to the general consensus of expert opinion, the Piltdown skull be placed in this period. Another relic sometimes said to belong to the Pliocene is the strange remains found on the other side of the world, in Java, on the eastern bank of the Solo River, near the native village of Trinil. Here Dr. Eugène Dubois, a surgeon in the Dutch Army, came

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upon a fossiliferous bed, about four feet in thickness, lying at the level of the present stream, from which he removed, between 1891 and 1894, the remains of twenty-seven kinds of animals, mostly now extinct. Below this section there was a stratum of conglomerate, beneath this a layer of clay, followed by a marine deposit corresponding to our crag formations. Above the fossiliferous bed were stratified deposits of sand similar to those at the Mauer pit, and it was here that he found in 1891 the roof of an extraordinary skull, three teeth, and a massive thigh bone. Later a fragment of a lower jaw is alleged to have come to light.

Unfortunately the deposit cannot be dated precisely, as the strata in which the remains occurred could have been laid down as well at the end of the Pliocene as at the beginning of the Pleistocene, or vice versa, while the animal remains are equally indecisive. Moreover, no implements have been discovered. Doctor Dubois assigned the fauna to the close of the Pliocene, after comparing it with specimens found in similar deposits in India, and he thought the other

fossil bones were of the same age. But these conclusions have been questioned by many authorities. The brain case of the fossil in question is remarkably ape-like, revealing an extraordinarily narrow forehead and frontal region, and the cranial capacity is below the human standard, being estimated at 855 c.c., whereas the minimum volume of a human skull is 1000 c.c. On the other hand, Prof. Elliot Smith thinks that the part of the brain controlling the power of speech was sufficiently developed to enable the creature to make very simple utterances. The teeth are also human in type, with certain ape-like features and divergent roots. Again, the thigh bone is remarkably straight, suggesting that a more or less upright posture was adopted. It would seem, then, that the name of *Pithecanthropus erectus* given to this fossil is justified, inasmuch as it combines ape-like traits with such human features as the erect posture and possibly a rudimentary form of speech. As Sir Arthur Keith has said, "In stature, shape, and weight of body, *Pithecanthropus* was human"—human, in fact, in all its parts.

save the brain, and even here there are important points of divergence from that of the ape. He was a creature probably social in habits, with a larger brain case than that of the anthropoids, and a power of communicating his experiences beyond that of other mammals. Yet his mental capacity was scarcely truly human. In short, he seems to be best understood as a man-in-the-making, a "might-have-been," rather than a missing link, living either at the end of the Pliocene or the beginning of the Pleistocene. This, however, will become more apparent when we consider man's ancestry in greater detail, which is the subject of the next chapter.

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Chapter II

THE ANCESTRY AND ORIGIN OF MAN

FROM the foregoing survey of our knowledge concerning the early types of man it will have become apparent that several "fossil races" existed at the beginning of the Glacial Period, and probably also in the dim and distant days of the Pliocene Sub-period of the Tertiary Era, when it would seem the earliest tool-making members of the human family were abroad. But so far as actual fossil remains are concerned, we can only be certain of the existence of two very different types of humanity at the very beginning of the Quaternary, as exemplified in the Piltdown skull, with its comparatively modern form of head and very ape-like jaw, and the more brutal-looking *Homo Heidelbergensis*, who may have been a fore-runner of the Neanderthal race. In addition

to these, there is the strange relic from Java, which appears to represent a sort of "ape-man-who-stood-erect" or *Pithecanthropus*, which does not exactly fit in the human line of ascent, though he was very nearly human. His brain, for example, was pre-human rather than pre-anthropoid, being both larger than that of an ape and more human in its structure. In short, the Java remains seem to belong to a side branch of the human family, a tentative man, and not a direct ancestor of our English *Eoanthropus*, or of the Heidelberg and Neanderthal types. The problem of man's ancestry, therefore, is not as simple to-day as when it was assumed that there had been a gradual ascent from the anthropoids through *Pithecanthropus*, regarded as a "missing link," to the heavy-featured *Homo Heidelbergensis*, the supposed progenitor of the cave men of Neanderthal, who in their turn gave place to the Crô-Magnon variety of *Homo sapiens*. It now seems, however, that just as to-day man is represented by many and diverse races—black, brown, yellow, and white, some developing, others disappear-

ing—so in the past our ancestors revealed an even greater diversity, and to unravel the mystery of man's pedigree we have to survey the whole stock from which he emerged.

Apes and Man—Man clearly belongs to the groups of mammals called Primates, but the popular notion that he has descended from monkeys and apes requires a good deal of modification to bring it into line with the scientific evidence. The so-called "gorilla theory of human ancestry" is merely a popular fiction, Darwin himself, long before the fossil remains of early man came to light to act as a guide unto our path, maintaining that none of the known anthropoids, much less any of the monkeys, belongs to the direct human ancestral stock. Subsequent research has tended to show that while man unquestionably has a mammalian ancestry, really he has followed an independent ascent of his own, reaching far back into the Tertiary Era, probably connected with an arboreal stock which acquired the bipedal habit at a very early period.

The embryological and anatomical evi-

dence cited in the last chapter demonstrates both man's mammalian ancestry and his "apartness." That a "blood relationship" exists between ourselves and our nearest relatives has been shown by Professor Nuttall's experiments, which reveal that when human blood is transfused into a chimpanzee there is a harmonious mingling, as when the experiment is performed with the blood of a rabbit and of a hare. This result, however, is not obtained if the blood of a rabbit is mixed with that of a dog or an anthropoid ape. Similarly, when the serum (blood fluid) of a rabbit which has had human blood injected into it is mingled with the blood of mammals off the simian line altogether, there is no reaction at all. It is possible by experiments of this kind not only to prove the general relationship between man and the apes, but also to determine the degree of kinship with the different varieties of anthropoids.

Similarly, bacteriologists find that apes and monkeys possess the same susceptibilities to infections, and manifest the same reactions to germs like those of tuberculosis

as do human beings; while the anthropoid, like the human embryo, is connected with the body of the mother by the same complex structures, and yet from beginning to end the human embryo maintains its own special characteristics. Thus man is organically related to the rest of the Primates, and at the same time he is a creature apart. Bearing these considerations in mind, let us proceed to an examination of the human genealogical tree.

Arboreal Ancestors of Man—The Primates are for the most part climbing animals, and therefore have limbs adapted for suspension, using their fore-limbs to grip the branches of trees, seize the fruit, and consume it. As the “hand” became more and more freed, the thumb (and the toe in the case of the foot) gradually developed as a fifth digit, so that things could be grasped more readily and securely. This made for the growth of the collar bone, and increased freedom of movement of the thigh on the hip bone, and enabled the backbone to become a more supple yet stable column

curved near the loins. Teeth were no longer used for carrying, and as a result the snout region began to recede, giving an increased cranial cavity, a forward thrust to the eyes, coupled with an increased power of turning the head from side to side. In the lower animals the eyes only see things directly in front of them; but man has acquired the power of focussing an image so that each eye independently gets an impression, thereby allowing him to see an object by moving the eyes without altering the position of the head. This *stereoscopic vision* is an enormous advantage, as it enables a creature to get a more complete view of its surroundings, and helps it to perform movements of the hands and of the body with greater rapidity and accuracy. In these ways a fuller understanding of the outside world is obtained, and this leads to an ever-increasing store of mental impressions. The arboreal mammals, however, were less hampered by "binocular vision" than most creatures, because they had developed the power of rapidly turning their heads so as to bring

both their large eyes into focus. The same mechanism also enabled them to locate sounds readily.

Brain Development—Now all this had a very marked effect upon the growth and specialization of the brain. The gigantic reptiles, such as the brontosaurus of Mesozoic times, had enormous bodies, reaching a length of some eighty feet, with a weight of thirty-five tons but ridiculously small brains. It is doubtless this overspecialization in bulk at the expense of mental power which caused them to become unprogressive, and finally led to their extinction. Size and weight, then, are certainly not the most important factors in the struggle for existence, as the mammals clearly show. Life in the trees makes for agility and develops the senses of sound, sight, and touch, which produce corresponding changes in the brain capacity. Just as the mental powers of dull children are often stimulated by a course in handicraft, so the freeing of the hand in the Tertiary Age unquestionably reacted on the growing brain of our arboreal ancestors. This mental improvement doubt-

less found expression in a restless inquisitiveness, a desire to investigate the world and launch out in various directions. At this stage the dawn of reason and intelligence may be said to have commenced, and it can hardly be placed later than the very beginning of the Tertiary, when in Eocene times small squirrel-like animals, similar to tree shrews, are known to have emerged.

Tarsius—The best example of these vivacious, large-brained creatures is a little mammal called *Tarsius*, which lives in the Malayan islands, and has remained practically unchanged since its ancestor, *Anaptomorphus*, first appeared in the Eocene. Its most striking feature is its huge eyes, and it is possessed of a remarkable power of moving its head, as well as holding itself erect. It has a short, flat face, with the hair directed forward as in man. The lemurs (which have also fossil representatives in the Eocene), on the other hand, have a snout with which they seize their food, and although their precise relation to *Tarsius* is a matter of dispute among experts, it is now generally agreed that *Tarsius* is more nearly allied to the

higher Primates than it is to the lemurs, the modern mammal being a "living fossil," as Smith Woodward has said, the sole living survivor of the primitive tarsioids.

The fact that these creatures depended more on sight than on smell made for inquisitiveness, and day by day new knowledge and experiences crowded in on the enlarged and developing brain. As the association areas developed, a sort of recording apparatus gradually arose for storing up the impressions of the senses, and at a moment's notice translating them into muscular actions. Hence the power of the quick-witted mammals of accommodating themselves without delay to the requirements of their circumstances, and readily adapting themselves to a new mode of life. It was out of the motor area controlling skilled movements that the pre-frontal region grew, which is the most important part of the brain, "the crowning glory and distinction of the human fabric." The beginnings of this seat of all the higher mental faculties are to be found in *Tarsius*, though only in such a rudimentary state

that it cannot have been much assistance in thinking out complicated ideas. Nevertheless, it represents the germ of human intelligence, and in this sense the beginnings of the human brain may be traced back to the dawn of the Tertiary Era, when the Eocene tarsioids flourished under the form of *Anaptomorphus*, *Tetonius*, and *Absarokius* in North America; and *Necrolemur*, *Pronycticebus*, and others in Europe.

That they were ancestral to the monkeys, apes, and man is now accepted as a working hypothesis by such authorities as Prof. Elliot Smith, Prof. Wood Jones, and Dr. W. K. Gregory, although upon technical questions of relationship there is a diversity of opinion. It would seem, however, that man's affinities are with an arboreal ancestor, the Old World narrow-nosed or catarrhine monkeys with long tails being in closer alliance with the human species than the flat-nosed platyrhines of the New World, who gave up attempts at all-round mental development and were content to remain where they were to the end. The alert catarrhines never lost an opportunity to enlarge their

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mental outlook, and wandered far and wide amid new surroundings, to which they were able to adapt themselves. Thus by the time the Eocene had become the Oligocene Period a new species had emerged, which must be regarded as a primitive anthropoid rather than a monkey—the forerunner of the gibbon.

Fossil Apes—This earliest fossilized remains of an ape, called *Propliopithecus*, was found in an Oligocene deposit in the Egyptian Fayum, having almost human teeth, the canines being weakly developed, and the incisors and premolars perpendicular in position. *Parapithecus*, also from Egypt, represents another example of the early apes nearest to man. As these primitive anthropoids wandered far and wide in Africa, Europe, and Asia, they increased in size as their power of adaptation developed, so that by the middle of the succeeding Miocene and in the Pliocene Periods new varieties began to evolve in Northern India. This is seen in the Pliocene fossil remains named *Paleopithecus*, recovered from a deposit in the Siwalik hills, near the Hima-

layas, revealing a generalized type of extinct ape closely related to the chimpanzee, the gibbon, and the gorilla, but having teeth with human characteristics, indicating that it was only in process of departing from the common direct ancestor. It may be that the ancestors of the orang-utan left the main stem as early as the Miocene, and the bones recently found by Doctor Pilgrim in the Siwalik hills, which he calls *Sivapithecus indicus*, perhaps belong to a tentative creature of this kind. He thinks, however, that this Miocene fossil is a member of the human family, but, as Professor Boule of Paris contends, these few fragments afford insufficient evidence to justify such far-reaching conclusions. But what they do show is that very early (*i. e.*, in the Miocene) the larger anthropoids had begun to specialize away from the more generalized humanoid stem. Another fossil ape of this nature is *Dryopithecus* (tree ape), a Miocene creature about the size of a chimpanzee, but with more primitive teeth and jaw.

The Anthropoids—So far, then, as our knowledge carries us at present, we may con-

clude that the small anthropoids—the gibbons—were in existence in the Miocene, and probably arose in the still more remote Oligocene. Then came the great apes, typified by *Dryopithecus*, and his Pliocene successor, *Palaeopithecus*, which shows relationships both to the chimpanzee and orang, though not probably a direct ancestor of either. But none of these fossil apes affords a satisfactory human ancestor. Rather they appear to be branchings from the humanoid stock which developed characteristics of their own and thus "went off at a tangent." The gorilla, for instance, gave up all attempts at "higher education" and went in for muscular development instead. Thus he became the giant among anthropoids, with massive jaws and teeth and very prominent, heavy brown ridges, his whole body weighing sometimes, when fully grown, as much as thirty stone. True, the gorilla brain, both in mass (about 520 c.c.) and in its convolutionary pattern, represents the highest anthropoid cerebral development, but mentally he is less alert than the chimpanzee, despite the smaller cranial capacity (about

400 c.c.) of the latter. Thus, although in many respects the gorilla approximates more closely to man than any other mammal, having a similar muscular system and adaptation of the lower limbs to terrestrial life, yet he has sacrificed higher qualities to mere bulk, becoming dull, morose, and fierce, whereas the smaller chimpanzee retains a keen sense of curiosity and a faculty for imitation, adaptation, and invention, all through his life. In a less degree the arboreal orang, with its long and powerful arms, swinging from tree to tree in a leisurely fashion in the Sumatran forest jungle, approaches nearer to man intellectually than the gorilla. Like the agile little gibbon, he has adapted his body to arboreal conditions, developing very long fore-limbs to enable him to suspend himself in an upright position from the branches of the trees in which he lives, but in neither case has the brain reached a sufficiently high degree of intelligence to allow him to use his hands for skilled work. This shows that it was not alone the adoption of the erect attitude that made man, otherwise the gibbon would have

reached the goal in the Oligocene, the orang in the Miocene.

The Origin of Man—If Prof. Wood Jones is correct in thinking that the human ancestor lived in the trees from the beginning, grubbing along on the ground on all fours may never have been a human characteristic. Arboreal life would certainly tend to make for a mental superiority necessary for the survival of the human species in the struggle for existence, when at length the required standard was reached for the battle of life on the earth. The original common ancestor was doubtless a small primitive gibbon-like creature, resembling in many ways the Oligocene *Propliopithecus*, the forerunner of the Miocene anthropoid forms, but with human affinities. It was probably while the anthropoids were busy settling their own fate in the Miocene and Pliocene that our ancestors were engaged in all-round development, and consequently making rapid strides toward the attainment of human intelligence. All kinds of new impressions were penetrating the slowly enlarging brain, where they became stored up

and associated with sounds and sights. In short, general ideas were being formed which were beginning to find expression in rational conduct. Descent from the trees doubtless also stimulated mental development, especially as apparently it was accompanied by the continuance or the assumption of the erect attitude, the hands now being used for tool-making, hunting, and the other arts and crafts which gradually developed with communal life.

The Place of Origin—Exactly when this took place and where we cannot be certain at present, but the probability is that the first members of the human family appeared somewhere in Asia or Africa at the end of the Tertiary Era. In favour of Central Asia as the region in which the proto-human ancestor adopted terrestrial life and became man has been urged the disappearance of forests as a result of aridity arising from land elevation in the Miocene or early Pliocene. But *Pithecanthropus* seems to have lived in the midst of tropical forests in Java, and although he probably was not definitely human, he was a very near relative

of man. Fossil apes have been found in the Siwalik hills, Asia being the home of the Miocene and Pliocene great anthropoids, of which the orang alone now survives, although the gibbon may be found still in the forests of the Indo-Malayan archipelago. A fossil form of this species has also been reported by Doctor Andersson from Ertemte, in inner Mongolia. The oriental grasslands were the chief home of the hoofed animals which have been the prey and companion of man throughout the ages, while it was on these steppes that early civilizations developed. But no race of primeval man has yet appeared in Central Asia, the recently discovered Neanderthal skull at Galilee being the most ancient oriental human remains, excluding the hypothetical *Pithecanthropus*. Earlier implements, however, are known in Asia Minor, and in the valleys of the Ganges, Indus, and Narbada. No Oligocene primates have as yet come to light in this continent.

The abundant evidence of human occupation and the presence of Miocene apes, to say nothing of *Eoanthropus*, have led some

anthropologists to regard Europe as the original cradle-land. The climatic conditions also were probably not unfavourable, and there are numerous examples of lemuroids and tarsioids in the Eocene deposits. But no European primate fossils have been found in the Oligocene, although *Dryopithecus* occurs in the Miocene, and other fossil anthropoids and monkeys existed in the Pliocene. The absence of Oligocene forms is a serious obstacle, since it was at this time that the human ancestor was in process of emergence. Nevertheless, if man did not actually begin his career in Europe, apparently he arrived in that continent very early, and made it an important area of characterization.

It was in North Africa that both the generalized anthropoids, *Propliopithecus* and *Parapithecus* lived in the Oligocene, and since they are the nearest fossiline forms we have to the ancestral stock at this critical stage in its history, Africa has an excellent claim to consideration as a possible cradle-land. Moreover, both the gorilla and the chimpanzee, man's nearest "cousins," be-

long to this continent. In the Miocene a fossil form of gibbon and a species of *Dryopithecus* occur in the Moghara beds of Northern Egypt, and in the Pliocene fossil monkeys, resembling baboons, and other catarrhines, have been found in North Africa and south of the tropical forests. The much-discussed skull which was unearthed by Professor Dart in 1924 at Taungs, Bechuanaland, in a deposit variously dated as early Pliocene or Miocene to Pleistocene, represents a non-human creature apparently more intelligent than either a gorilla or chimpanzee, and having a prominent forehead and small jaw like those of a human child. The chin, in fact, is more marked than in the Piltdown jaw, and although probably he was unable to talk, his brain seems to have been developing in a manner that would ultimately have led to his acquiring that power of speech. Unfortunately, however, this interesting extinct man-like ape—*Australopithecus*, as Dart calls it—was only about four or five years of age, judging from the teeth and the state of the sutures, and therefore we cannot be certain

how the adult would have grown up. We may hazard a guess, nevertheless, that the face would have been larger than that of a chimpanzee, and smaller than that of a gorilla, but more human in its features than either, for it seems to have been a young man-like ape rather than an ape-like man. But, unless it belongs to a very much earlier period than the geological evidence appears to allow, it can hardly be in the direct line of man's ancestry.

As regards human remains in Africa, apart from the Rhodesian skull, which apparently represents a late survival of *Homo Neanderthalensis*,* the evidence is confined to Chellean implements in the northwest region, especially in the Nile Valley and the surrounding high desert, and in the south. Unfortunately these have been found mostly under conditions which make precise dating impossible. The later Palæolithic cultures are very well represented, and there is strong reason to think, as will be shown later,

* Sir Arthur Keith regards it as an early offshoot from the common stem which produced Neanderthal man and *Homo sapiens*, subsequent to the cave period.

that it was from North Africa that the earliest migrations of modern man penetrated into Europe. But, of course, this does not throw light on the problem of the origin of the human race. It is rather the abundance of primates in the country from Eocene lemuroids (numbering eighty-seven species), Old World monkeys (catarrhines), baboons, macaques, to the great anthropoids, and the important fossils, *Propliopithecus* and *Dryopithecus*, that makes Africa a very likely place for the emergence of man to have occurred, in those distant days when the Sahara probably was a grass-grown plateau. The absence of tarsioids is the only really serious break in the ancestral chain of species.

The possibility of the New World having been the original home of man is so remote that it can be ruled out of consideration altogether in the present discussion. True, early tarsioids occur in the Eocene deposits of Wyoming, and lemuroids are also known; while a fossil form of platyrhine monkey has led to a discarded theory of human origin in *Homunculus patagonicus*. But the

absence of catarrhines, and any reliable evidence of anthropoids or of early man in America, seem to rule out all claim of the Western Hemisphere to have been the scene of man's emergence. Two teeth found in a Pliocene deposit in Nebraska in 1922 have been identified with a new variety of ape called *Hesperopithecus* by Professor Osborn and Doctor Gregory, but this at present is merely a conjecture which many European experts fail to accept.* Similarly, the various human skeletons in this continent alleged to belong to the Pleistocene are so very inconclusive that it may be assumed, so far as our knowledge carries us at the moment, that man did not reach the New World till the close of the Palæolithic, entering perhaps by the Bering Strait land bridge at the end of the Glacial Period.

At the other side of the world, Australia, although the home of the most primitive race now living, has not revealed the remains of any primates at all prior to the advent of its archaic aboriginal inhabitants.

* In the light of further investigation Doctor Gregory has now given up this claim. Cf. *The Times*, Feb. 21, 1928.

Huxley thought that both the Australians and the Tasmanians were the survivals of Neanderthal man, but this view is now abandoned. It is nevertheless true that the type is very ancient and primitive in character, with its low, retreating forehead, projecting jaws and brow ridges, large teeth, and small cranial capacity. The natives are still living in the "Stone Age," but their implements resemble the later so-called Magdalenian types (cf. p. 19), while the polished axes show Neolithic characteristics. The Tasmanian tools are more primitive, having even been compared with eoliths. But Mr. Henry Balfour's estimate of their having affinities with the earliest culture of *Homo sapiens*, that called Aurignacian, is more probable. They were apparently the only people who remained in a really Palæolithic state of culture throughout the ages until they became extinct in 1876. Their ruder implements resemble pre-Palæolithic forms in many respects, but on examination they reveal a technique comparable to that of the Aurignacian industry, bearing in mind that the Tasmanians have

been in an arrested state of development since they were cut off from the mainland by the formation of Bass Strait. Therefore a complete analogy to European Palæolithic types cannot be expected to exist, but anyone with the requisite knowledge who examines the collection of implements in the Pitt-Rivers' Museum at Oxford can hardly fail to see the general conformity in type, suggesting that the people who made them were isolated survivors of a Palæolithic race.

The evidence of man's existence in the Australian continent in prehistoric times is slender. Implements thought by some to belong to the Pleistocene have been discovered at Shea's Creek near Sydney, but the precise age of the deposit is very doubtful, and other flints have occurred elsewhere under similar conditions. More recently a fossilized proto-Australian skull has been found at Talgai in Queensland, presenting the distinctive traits of the modern natives in association with even more primitive features in the teeth and jaws. The precise date of this interesting find is difficult to place, but there are indications of the

presence of the dog, which suggests that it is not earlier than the end of the Pleistocene. It seems probable, therefore, that the Australian blackfellow represents an early and primitive type of humanity isolated in prehistoric times—so long ago, in fact, that all memory of the original migrations from Asia has been forgotten even in the tribal traditions, which, in the central region, look back to a dream time, or *Alcheringa*, in which their ancestors were formed and their customs and ceremonies instituted, after the “salt water covering the country” had been withdrawn. This absence of migration myths suggests that the land was occupied by the natives at a very early period, and it is not improbable that the Tasmanians represent even a more ancient migration, possibly of a people of Negroid stock, intermediate between the Melanesians and the Negritoës, who were in a state of culture similar to that which prevailed in Western Europe at the beginning of the Achen retreat of the ice (cf. p. 17)—the Upper Palæolithic, as it is called culturally. But in any case, while the early history of the

human race in Australia unquestionably goes back to prehistoric times, there is no reason to suppose that man first arose in this continent.

The Unity of Man—We are reduced, then, to two, or at the most three, possible homes of the human ancestor—one situated in Asia and the other in Africa, with Europe as a third consideration, if additional evidence weighs strongly in its favour. Various factors were concerned in the emergence of man—increase in mental complexity and brain growth, the elaboration of the hands, and the power of “opposing” the thumb and big toe to the other digits, the assumption of the erect posture, the attainment of stereoscopic vision, and the free movement of the jaws as a result of the reduction in the size of the canine teeth, as one of the preliminaries to the acquisition of the power of speech. It is hardly likely that all these fundamental changes took place simultaneously in more than one place and at one time. There is therefore reason to think that the human family may have been derived from a single pair. This surmise derives support from the

fact that complete and permanent fertility is possible when unions are contracted between members of different races. Such racial intermarriage and crossing would be hardly possible apart from the fundamental unity of man. The likeness in the structure of the human body and in the working of the mind also points to a common ancestry, however distant. This, however, is a very intricate problem, and one upon which, in the present state of our ignorance, it is rash to dogmatize.

Man as a Social Being—The helplessness of the human baby at birth, and for a considerable time afterward, implies a longer and more intimate association between mother and child, which has had a profound effect on the fostering of family life and human affection, as well as acting as a stimulus to intercommunication and the development of language. Parental instincts have been observed among the anthropoids and other animals whose offspring are numerically small and need constant attention during infancy. But their young always develop so very much more rapidly; the chim-

panzee, for instance, being full grown at about twelve years of age, and in a state of senility at forty. Therefore the family and social sense is not as strongly developed. Man by nature is gregarious, and however attractive the adventures of Robinson Crusoe may be to youthful imagination, the story is not really true to life, for the conditions it presupposes do not actually exist on "desert islands." In fact, it is doubtful whether one man alone could survive long, human beings requiring society, help, and protection which the one gives to the other both in prosperity and adversity. Therefore, if the unity of man be assumed as the primordial condition, it could not have lasted long, the family being the real and permanent unity of human society. At first the group doubtless was small, for the economic conditions would hardly support large populations in one place. There was, in fact, little to encourage social intercourse on the larger scale so long as hunting was the normal occupation, a few groups associating themselves for purposes of mutual protection and coöperation sufficing, though adverse climatic

conditions drove men more and more together around a common hearth.

But the more human beings were forced into communities, the more apparent would the advantages of this mode of life become to people physically far weaker than the great beasts around them, always provided that it was an economically possible arrangement. The great anthropoids could afford to stand alone better than man, since, however muscular *Homo Heidelbergensis* may have been, he can scarcely have had the strength and ferocity of a gorilla. Man lived by his wits and the works of his hands, and not by his fists. But a flint implement hurled at a mammoth-like elephant, protected by layers of fat and wool, as well as by a thick fur coat, would produce about as much effect as does a tin tack on a modern motor tire. To secure his prey he was compelled to resort to traps and various cunning devices, and these often required the coöperation of a number of persons. Thus, long before the discovery of agriculture—which marks the real beginning of village and town life—human beings were living in small com-

munities, as is the custom among hunting tribes to-day.

The Family—But was it as an undivided commune or in families that human society began? To this important question it is difficult to give a decisive answer. At one time the notion of primeval sexual promiscuity was very popular, largely because it supported the theories of primitive common property, and of economic determinism advocated by the Marxian school of Socialists. But since the matter has been reconsidered scientifically in relation to the actual evidence, it has become apparent that this conclusion is by no means as obvious as it formerly was thought to be. Among animals like the reindeer, the seal, the squirrel, the hippopotamus, and the mole, permanent mating is known to take place, the male as well as the female being susceptible to the charms of the offspring. This is also sometimes the case with anthropoids, while in human society marriage and family life prevail everywhere. Doctor Westermarck, the leading authority on the subject, maintains that "there is not a shred of genuine evidence

for the notion that promiscuity ever formed a general stage in the history of mankind." The hypothesis, in his opinion, not only "lacks all foundation in fact, but is opposed to the most probable inferences we are able to make as regards the early conditions of man."

This conclusion is certainly in accord with the data available from modern races in a primitive state of culture. Nowhere to-day does promiscuity actually exist. Thus, for example, of all the tribes in Central Australia described by Sir Archibald Spencer and Mr. Gillen, there is not a single case in which marriage in some shape or form is unknown; the rules governing the social organization of the tribes, and the regulations controlling marriage classes and prohibited degrees, being of a most complex character. Normally, in primitive communities a man has only one real wife, though he may be allowed to contract supplementary unions with other women, but only if they are in a special relationship to him by belonging to a particular marriage group. Monogamy, in fact, as Doctor Westermarck says, "is the

form of marriage that is permitted among every people. Whenever we find polygamy (the marriage of one man to several women), polyandry (the marriage of one woman to several men) or group marriage, we find monogamy side by side with it. On the other hand, it is also in many cases the only form of marriage which is permitted by custom or law."

Living an active outdoor life, early man's desire for offspring was probably less intense than in later times, when wealth began to accumulate. In a struggling hunting community large families are a hindrance rather than a help. Thus we find polygyny belongs essentially to the more advanced civilizations like those of Mexico, Egypt, India, and the Ancient East generally, where in Israel, for example, Solomon, at the height of his prosperity, is accredited with no less than "seven hundred princesses and three hundred concubines" (I Kings xi. 3). Even on the more probable estimate of the Book of Songs (vi. 8), threescore queens and fourscore concubines would be an intolerable burden under Palæolithic conditions.

Therefore, apparently, it was not till the discovery of agriculture and the domestication of animals had given increased openings for female and child labour, and stimulated the desire to possess wealth, that the tendency developed to multiply wives and create huge families. In the wild life of the chase in the earliest days of man's earthly pilgrimage, the family probably consisted generally of monogamous parents and their children, the male being engaged mainly in hunting expeditions, the woman staying at home and becoming more and more a nurse.

It may be that normally the wife lived in the same settlement as her own relations, like Delilah in the Samson story. If this was so, "mother-right" is older than "father-right," since when the woman dwells with her own people descent is reckoned *matri-lineally* (*i.e.*, through the mother, and not the father), just as it is she who has the care and control of the children. But as the man was forced indoors by inclement weather in the Cave Period, he doubtless came to exercise more and more authority in the home, till finally he gained complete supremacy

as pastoral patriarchal conditions, so graphically described in the Book of Genesis, were adopted on the grasslands in the early stages of civilization.

It would seem, then, that marriage was a habit at first, but it quickly became a tribal institution regulated by custom and law. Moreover, this permanent partnership fostered love between man and wife, parents and children. In the words of Westermarck, "marriage is rooted in the family rather than the family in marriage." Something like polygyny and even sexual communism may have occurred in certain cases and at special times of licence, but there is no reason to think that human society as a whole ever passed through a definite state of promiscuity in which each man paired with any and every woman, like rabbits and the more depressed domestic mammals. However little paternity was understood at first, human groups probably originally consisted of small families composed of parents mated for life, in which affection was by no means unknown. Sociability and marital and parental care have a "survival value," and

therefore represent important factors in the ascent of man. For, as Doctor Marett has said, "culture depends on social organization," and this, in the last analysis, can be reduced to "papa, mamma, and baby" as "the nucleus of human society." For greater security families would tend to associate themselves in a group, and with the discovery of fire, the hearth doubtless became a social centre, a promoter of intercourse and language. Thus in a sense it is true to say, "man did not make society, society made man," since it was community life which played such a prominent part in calling forth his higher human instincts and qualities. This will become more apparent in the next chapter, in which we shall pass from the lowly ancestry of man to a consideration of his progress as *Homo sapiens*—a being equipped with creative intelligence and æsthetic and spiritual appreciation.

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*Chapter III*THE COMING OF "HOMO
SAPIENS"

WITH the retreat of the ice at the end of the last or Würm glaciation, about 20,000 years ago, great changes became apparent in Western Europe, not only in climate, but also in the physical type and culture of the inhabitants, the primitive Neanderthal folk giving place to what appears to be a new type of humanity. True, there are indications of a transition from Mousterian to Aurignacian implements, and Doctor Hrdlicka has recently maintained that changes in climatic environment brought about greater mental as well as physical exertion, with an intensification of natural selection, so that the more fit of the cave men survived as *Homo sapiens*. Thus the Neanderthal or Mousterian phase was merely an earlier stage in the ascent of modern man. In this way the absence of any

evidence of a pre-Aurignacian stock is overcome, but it is difficult to believe that changes of environment, calling for new adaptations and developments, are sufficient to account for the very marked alterations in physique and culture that characterize the Upper Palæolithic. It seems much more likely, in our opinion, that the people who inhabited the caves during the long winter of the fourth glaciation, and struggled so bravely against adverse conditions, never lived to enjoy the less strenuous conditions of the more temperate Achen oscillation. Some appear to have moved southward as the cold increased at the maximum glaciation (*c.* 23,000 B.C.), some seeking shelter in Italy on their way to Sicily and Malta, others going by Gibraltar to North Africa, possibly to Rhodesia, while a remnant apparently remained in the French caves. A few survived the second maximum of the Würm on the northern shores of the Mediterranean, but whether they ever came into actual contact with the first representatives of modern man it is impossible to say.

The Aurignacian Culture—The newcomers were very different from any of the early types we have previously encountered. If they represent a new race or races, doubtless they had gone through a long history before they reached Western Europe with their new culture, consisting of sculpture, engraving, and painting, an assortment of flint and bone engraving tools, as well as end-scrapers, notched implements, spokeshaves, planes, etc. This is known collectively as the *Aurignacian* industry, because it was at a grotto near Aurignac, in the Haute Garonne, France, that the new culture was first recognized. Some of these types bear a resemblance to the Mousterian implements of the previous period, it is true, but it is almost certain that the *Aurignacian* industry was not actually derived from the Mousterian, though in its earliest European phases, as revealed at the rock shelter at Audi near Les Eyzies in the Dordogne, it may have been influenced in some measure by the earlier culture.

The Capsian Culture—A closer affinity, however, can be established with the forms

found in an Upper Palæolithic deposit at Gafsa, the ancient Capsa, in Tunisia. This *Capsian culture*, as it is called, is thought to have preceded the Aurignacian, and to have spread into Spain and Italy, as well as along the North African coast. It may be, then, that *Homo sapiens* appeared in North Africa before he made his way into Europe, the Sahara at that time being a fertile region with grasslands and perhaps forests. But only a section of the people migrated northward, as the Capsian culture continued in Africa till after the Palæolithic had come to an end, the remnant possibly playing a part in the first invasion of the Mediterranean race into Europe from the south at the end of the “Neolithic.”

The Grimaldi People—Let us now betake ourselves to one of the earliest settlements of modern man in Europe, situated on the Mediterranean coast where France and Italy meet. Crossing the frontier from Menton, the little Italian village of Grimaldi stands on the top of the cliffs called the Rochers Rogues, at the base of which, now marked by the entrance of the railway tun-

nel through the rocks, are a series of seven caves (originally there were nine), which it has been alleged continue under the sea. To-day the blue waters of the Mediterranean flow almost to the entrance of these caverns, but in former times the Via Aurelia passed under the cliffs. Earlier still, when Palæolithic man made his home therein, a wide marshy plain, with lagoons and a rich vegetation, took the place of the sea. Here he hunted the warmth-loving animals, retiring at night to the safety and shelter of his cliff dwellings. Happily he was none too tidy in his habits, and therefore he has left plenty of his rubbish behind, including the ashes of his fires, the bones of the animals he had eaten, the tools he used, and even some of his companions whom he laid to rest with the utmost care and ceremony, testifying to his belief in a life after death.

When Albert I, Prince of Monaco, excavated the first of the series of caves, that called La Grotte des Enfants, he came upon the skeletons of an old woman and a youth of about sixteen years of age in the lowest floors of the cavern, while in the stratum

next above the remains of a very tall man occurred. Above this was the grave of two children, aged four and six respectively (from which interment the cave derives its name), and, finally, in the uppermost level was the burial of a woman of moderate stature lying on her back, three feet nearer the surface. Originally the cave had been a hyæna den till it was occupied for a short time by the Mousterians. It was in the Mousterian deposit that the skeletons of the old woman and the youth were found, but the grave appears to have been dug from the overlying Aurignacian floor. It is therefore generally thought that the interment was made at the very beginning of the Upper Palæolithic.

These skeletons are now preserved in the interesting little archæological museum in the Prince's principality of Monaco (now ruled by the son of the excavator of La Grotte des Enfants). On a magnificent rock, standing as it were in the sea, is the old town of Monaco, with its ancient castle of the Grimaldis and its barracks, a fine Byzanto-Romanesque cathedral, and an

oceanographical museum. The last two edifices have been erected from the profits of the world-renowned rococo Temple of Chance at Monte Carlo, on the opposite hill, where modern and very *mondain* representatives of *Homo sapiens* from all nations foregather in its ornate *salles de jeu* in a vain attempt to pit themselves against the laws of chance. It would be interesting to hear the opinion of the men of the Rochers Rouges, lying peacefully in their glass sarcophagi in the tiny archæological museum on the other side of the miniature harbour, concerning the mentality of their Twentieth Century successors, who, having conquered their environment after a great struggle for existence, thus fritter away their resources at *roulette* and *trente et quarante*, in striking contrast to themselves who, with all the odds of Nature against them, never rested till they had established themselves on the earth, beating Nature on her own ground. Thus they succeeded in making fire and flint their servants, and, having conquered the animal world, they turned their gloomy cavern homes into magnificent art galleries

and stately cathedrals.* But, alas! they speak no more; and we can but reconstruct their thoughts and manner of life with the help of the silent bones, stones, ornaments, and designs they have left to guide us in our quest.

An examination of the skeletons reveals several interesting and significant features which distinguish the old woman and the youth from the rest of the remains. The head is long and narrow (*i.e.*, dolichocephalic), the lower jaw projects and the chin recedes, as in the Neanderthal skulls, but to a less marked degree. The teeth are large and protruding, the nose is flat, the lower limbs are long as compared with the upper limbs, while the height of the woman was only about 5 ft. 2 in., and that of the young man about 5 ft. This type is not uncommon to-day in North Africa, and in the poorer districts in Mediterranean towns. Unfortunately these two skeletons are the only examples of this so-called “Grimaldi race” (named after the village above their home in the Rochers Rouges, and until other representatives come to light it is impossible

* The Grimaldi caves, however, are not decorated.

to say precisely what their relation was to the rest of the Aurignacian population. Certainly they possessed some of the variations found also in the African Negroes, the proportion of the lower limb to the upper one being a Bushman characteristic, while the broad, flat nose, the absence of brow ridges, and the prognathous (projecting) jaw are other links with some of the African natives. Their skulls, however, were higher and rather larger than their modern prototypes.

Crô-Magnon Man—While the extreme care taken in laying the bodies to rest in La Grotte des Enfants, with legs and arms drawn up like Peruvian mummies, ornamented with pierced shells, and surrounded with red ochre and protecting stones, indicates that they were members of a definitely established race rather than intruders, yet they differed in type considerably from the rest of the Aurignacian folk. The other burials in the Rochers Rouges caves are those of tall, well-built, and finely developed people, with legs and arms rather longer in proportion than ours to-day. They must have been of a "goodly countenance," but, unlike

most long-headed races, they had comparatively short, broad faces with high cheek bones; features which incidentally may still be observed in some of their shorter descendants in the neighbourhood of Les Eyzies.

It was, in fact, at this famous Dordogne village that the type was first discovered in 1868 by a gang of workmen engaged in the construction of the railway connecting Périgueux with Agen. Adjoining the village an old rock shelter was opened at Crô-Magnon, now part of the Hôtel de la Gare, on the road from the village to the station. A thorough investigation of the site under the direction of M. Lartet led to the discovery of the skull of an old man with his wife and baby. A tragedy of some kind seems to have occurred, as the woman's forehead showed signs of a deep wound inflicted by a sharp instrument, and the baby had been prematurely born. But whatever the circumstances may have been under which they died, be it a family quarrel or an accident, they were buried with the greatest care and ceremony, more than three hundred marine shells hav-

ing been laid with the bodies, perhaps strung together to form necklaces, as well as other amulets such as perforated teeth and ivory pendants.

The skull of the old man was in excellent preservation and revealed a high degree of intelligence, with its well-developed pre-frontal region and large cranial capacity. Moreover, the bodies, like the brains of the Crô-Magnons, were up to the modern standard, and taller than the present-day inhabitants of the Dordogne, the man standing about 5 ft. 11 in. In the caves of the Rocher Rouges on the Riviera, except in the case of the Grimaldi skeletons, all the remains were of this type, but they were taller than the old man of Crô-Magnon, being well over 6 ft. In the Grotte des Enfants the man found by M. Villeneuve in the stratum above that containing the woman and the youth measured about 6 ft. 3 in., his head lying on a flat stone reddened with ochre and adorned with a sort of covering of pierced shells on the chest and around his head. The body was partially protected by large stones, and a deerhorn

implement lay near his head, together with perforated deer teeth. The woman in the grave nearest the surface was much shorter and distinctly elderly, but the bones were in such a bad state of preservation that no details regarding her physique can be determined. She appears, however, to have belonged to the Crô-Magnon type. Like the others, she had been protected by large stones and surrounded with multitudinous shells, some flint implements, and the bones of various animals, with a pebble painted red under her head. But hyænas seem to have dug up the corpse, which was then reburied ceremonially under stones, doubtless in the hope that this time it would be safe from molestation. If this is the correct explanation of the interment, it shows the tremendous importance the Aurignacians attached to proper burial, and it accords with the vast quantities of amulets and ornaments laid with the bodies, the children, for example, having been placed in a shroud of nearly a thousand sea shells, with a flint implement between the skeletons.

The fourth cave of the series, known as

La Grotte du Cavillon, contained one burial, at a depth of 21 ft. 5 in. The body was that of a Crô-Magnon man, 6 ft. 1 in. in height, laid in a crouching position, with more than two hundred pierced shells and twenty-two perforated teeth about his head. Two flint knives lay at the back of his neck and an implement of stag's horn across his forehead. His body was covered with red ochreous powder, which had stained the bones, as in the case of a similar skeleton found in the Paviland cave in South Wales.

The next (*i.e.*, the fifth) cave is called Barma Grande, and it is this which is usually shown to visitors to the Rochers Rouges, as some of the bodies here have been preserved in glass cases in the entrance, and a small museum has been erected just outside the cavern by the late Sir Thomas Hanbury to house the objects extracted from the site.

In the opening of Barma Grande was a quantity of "kitchen middens" or refuse used as a fertilizer, and it was in digging out this that the first burial was discovered in 1884. The skeleton lay on its back in a stone-lined grave, with the head stained with

ochre, about 28 ft. below the surface. A flint flake had been laid on top of the head, and two other implements on his shoulders, with a few teeth near by. The skull (which is now in the museum at Menton) is that of a Crô-Magnon man, but it has been so badly damaged that little else can be determined from it. Some years later (1892) a second interment came to light, and then a thorough excavation of the cave was undertaken by Professor Verneau of Paris, with the result that the remains of a tall man, a young woman of about eighteen years of age, and a boy of perhaps fifteen were unearthed in a pit lined with red ochre and surrounded by the usual ornaments, consisting of perforated shells, teeth, and the vertebræ of fish. There was also a curious ivory object on the chest of the man and the girl and near the boy's head, which the Abbé Breuil takes to be a fastening for a cloak. There were also several fine flint implements near the bodies, and the bones of Palæolithic animals. A glance at these human remains in the glass cases at the entrance to their home will reveal to the initiated typical Crô-Magnon

features, and the objects found with the bodies, like the method of their interment, testify to their belonging to this race.

The same applies to the rest of the burials in the cave, but in the grave in the stratum above that containing the three skeletons just described a large piece of gypsum near the man's left hand took the place of flint implements, and there was also an absence of red ochre. Although the skull has a huge cranial capacity, the physical characteristics are the same as the other examples, and with the body were numerous *Nassa neritae* shells, deer teeth, and other pendants. Near by was a burnt skeleton in a crouching position, surrounded with shell ornaments. It has been suggested that this represents an attempt at cremation, but at present we have no adequate reason to think that this rite was performed in Palæolithic times, all the other circumstances of the burial in question being those of a Crô-Mag-non interment. Similarly, in the next cave, that of Baousse da Torre, three skeletons have been discovered at different levels, and, except in one case, buried with the custom-

ary red ochre, shells, teeth, and implements. The remains were in a bad state of preservation, one body bearing signs of having been disturbed by hyænas, but they were essentially of Crô-Magnon type.

The Men of the Rochers Rouges—From this evidence it is clear that two varieties of *Homo sapiens* inhabited the caves of the Rochers Rouges in Aurignacian times, of which that called “Grimaldi,” having affinities with the present North African population, was probably slightly the earlier. The taller and more robust Crô-Magnons, which appear to have predominated both here and in the Dordogne, probably represent a rather later migration, but in any case the two races coexisted in Western Europe. The name Crô-Magnon has been used in a general sense to describe all the Palæolithic representatives with the exception of the two Grimaldi skeletons, but it is now clear that while this race was widespread, extending from the Riviera to the Gower coast of Glamorgan, there was also a third type shorter in stature (about 5 ft. 3 in.), with deep-set eyes, prominent cheek

bones and brows, broad noses, projecting upper jaws, and narrower faces than the Crô-Magnons. Skulls of this nature have been found at Brünn, the capital of Moravia, some sixty miles north of Vienna, at Brüx in Bohemia, and at Combe Capelle, near Montferrand, Perigord, in France.

The researches of Professor Absolon in the loess deposits at Prědmost, a small village in Czecho-Slovakia, have revealed a burial containing no less than twenty human skeletons of this variety in association with mammoth bones and covered with a layer of stones. With the remains a unique collection of objects have been found, including horn "buckles," apparently used for fastening clothes together, horn needles, daggers, mammoth bones shaped rather like spades and forks, human figurines in clay, and models of mammoths in ivory. The flint tools are of Late Aurignacian types, and it is to this period that the skeleton from Combe Capelle in the Dordogne seems to belong. Skulls having similar features have recently come to light at Solutré in Saône-et-

Loire in Burgundy, also said to be Aurignacian.

The Solutreans—It seems, however, that a new race entered Europe from the East about this time and brought with them some of the most magnificent flint implements ever produced outside Egypt. These people are thought to have proceeded along the Danube valley to the plains of Central Europe in pursuit of the wild horse and cattle, finally making their way into France, where they settled at Laugerie Haute near Les Eyzies and at Solutré. They are called *Solutreans* because large numbers of their beautiful thin blades of flint shaped like a laurel leaf occur at the foot of a steep cliff at Solutré, though probably Laugerie Haute is really a more typical site of the industry. It is hoped that the excavations at Prédmost may throw some light on the problem of this migration, which appears to have entered Europe in the later part of the Aurignacian, as the weather became milder, in the wake of the hoofed animals which fed on the grassy plains. It may be that these

first settlers mingled freely with the Crô-Magnons in the West, but as other streams made their way from the East into Bavaria and France they became established, and finally succeeded in obtaining the mastery of the land, except in the Pyrenees, penetrating even into some of the strongholds of the earlier population in the highlands of the Dordogne. But in process of time there was a change of climate, and as the air became moister pine forests sprang up on the steppes. This was not to the liking of the invaders, who returned to their original home in the East, except for the few who survived in Southwest France. The hoofed animals also dispersed, some going eastwards, others migrating to the north. Until we know more about the actual mortal remains of the Solutreans we cannot be certain about their movements, but from such evidence as we have at present this seems to be a probable explanation of this remarkable phase of Palæolithic culture.

The Magdalenians—With the disappearance of the Solutreans after their short reign, flint-working declined as rapidly as it

had risen to perfection under the new influence. The Aurignacian type of culture prevailed again, but in a rather changed form. The snowfields and glaciers once more increased as the Bühl advance set in about 10,000 B.C., and Arctic animals again appeared on the steppe lands. It seems very probable that while the Aurignacians had been living in their enforced retreat in the Pyrenees they developed a new culture, and perhaps the scarcity of flint led them to a more abundant use of bone and horn. Any-way, when we encounter this new culture, called *Magdalenian*, from its type station at La Madeleine in the Dordogne, between Les Eyzies and Le Moustier, it is composed of numerous graving tools and weapons made from the antlers of reindeer, stag, and later of red deer. The flint implements are long, narrow flakes struck off from a core by a single blow, sometimes curved with a con-cave inner surface, but without secondary chipping on the edges or any trace of pres-
sure flaking. Toward the end of the first stage of this industry harpoons begin to appear, and other throwing weapons, such as darts

headed with points cut from reindeer antlers, or made of long shafts of wood fitted with thin blades of flint, or tipped with pieces of horn. Some of these implements have magnificently carved animal designs engraved on them, doubtless to give magical power to the javelin. It is in this period that the so-called *bâton de commandement* made its appearance, consisting of a perforated piece of reindeer horn elaborately engraved, variously interpreted as an arrow-straightener, an insignia of office, and a belt or rope fastener.

Engraving and Sculpture—These Magdalenian carvings, however, are not the earliest examples of Palæolithic engraving, for the Aurignacians were in the habit of making designs of animals, such as the mammoth, horse, reindeer, and bison, on the walls of their caves, as may be seen by anyone who visits the cavern called La Mouthe above Les Eyzies, the entrance to which was blocked up by a deposit at the end of the Aurignacian, and therefore it was not entered by the Magdalenians. A statuette of a mammoth sculptured in relief on ivory from

Prědmost, and some relief carvings from a cave at Bourdeilles, Brantome, Dordogne, also appear to belong to this period or the Solutrean, while at Grime's Graves, near Brandon in Norfolk, the figure of an elk or red deer has been found engraved upon the crust of a flint which has been assigned to the Mousterian by some archaeologists. But the age of the floor is very difficult to determine, Grime's Graves generally being regarded as a Neolithic site.

The Aurignacians mainly seem to have first made figures in the round and then in high relief, their statuettes usually being of fat women carved in limestone, with the organs of maternity grossly emphasized, like the figurines found in Crete, Egypt, and Western Asia in connection with the cult of the Mother Goddess. Some have thought that they are portraits, and have argued from this in favour of the African origin of the Grimaldi people, because a curious enlargement of the buttocks (known as “steatopygy”) is a characteristic feature of the South African Bushmen. But there is no proof that it was the Grimaldi race

who made these statuettes, and it is ungenerous, in the absence of definite evidence, to assume that the Aurignacian ladies resembled these uncomplimentary figures. Probably they were the work of the tall, well-built Crô-Magnons, and, in any case, the Grimaldi skeletons do not indicate abnormal features in these respects. It is much more likely that really they are early examples of life-giving amulets; prototypes of the Mother Goddess of later ages. This, in fact, is suggested by one of the sculptures in relief found at Laussel near Les Eyzies, depicting a woman of normal proportions holding a bison horn in her right hand. Traces of red colouring matter can be seen here and there on the figure, and red symbolism everywhere among primitive people is connected with the notion of life and vitality. Thus the dead in the Rochers Rouges caves, and again at Paviland, were buried with red ochre and in red-stained earth, probably in the belief that they would thereby be revivified and awaken in the hereafter with renewed strength. Shells were also apparently looked upon as amulets of a

like significance. These female statuettes, therefore, would seem to be fertility charms rather than portrait statues.

Cave Designs—But the Aurignacians did not confine themselves to engraving and clay modelling, for we find also attempts at painting in their caves. The earliest examples are rather like children's scribblings, being simple outline drawings badly proportioned and lacking in detail. The animal is generally depicted in profile, having only two legs, but the horns are represented as if viewed from the front. The head is too small for the body, and the hind parts are omitted. Nevertheless, they show vigour and powers of observation, the faults being those of an apt child learning to draw. If the oldest paintings in the rock shelters of Eastern and Southern Spain should prove to be the work of Capsian peoples, as Breuil and Obermaier surmise, they may turn out to be much earlier than has hitherto been supposed, which would account for the designs being so much more crude and childish than the later Magdalenian artistic creations of the Crô-Magnons. The human figures are drawn

in silhouette, frequently crudely conventionalized, the women clad in wide skirts of crinoline type, while the hunting and fighting scenes are more like the Bushmen rock paintings than those of the Palæolithic caves in Europe. Sir Arthur Keith is convinced that the Bushmen evolved in South Africa from a Mousterian ancestor, contemporaneous with the European Aurignacian Period, and spread northward. If the earliest examples of the Eastern Spanish art belongs to the Palæolithic Capsian Period—and Obermaier has now shown that the drawings have been superimposed in some places so that a chronological series can be determined—they may have been inspired by African influence, and therefore bear a marked resemblance to modern Bushmen designs. In this case some of them probably were executed in the Aurignacian, and testify to the existence in these far-off days of a new kind of silhouette art with very spirited human and animal figures, readily distinguished from the more realistic Crô-Magnon designs.

These representations, however, though

widespread, are confined to Africa and Southern and Eastern Spain. North of the Pyrenees the drawings are attempts at realism, the figures being sometimes engraved on the surface of rocks or cave walls and sometimes painted in red or black ochre. Heavy wavy and parallel lines, rows of dots, spirals, and silhouettes of hands, which had been laid on the walls and then smeared round with colouring matter, occur in early Aurignacian shelters like Gargas near Montréjeau, in Haute Garonne. Toward the end of the period the technique improved tremendously, modelling of the animal being frequently shown by shaded colour, sometimes by lines or dots. But with the Solutrean invasion, cave art seems to have practically ceased, partly because the artistic sense of the hunters from the East found expression in remarkable creations in flint, and also because these people were not essentially cave dwellers. True, they penetrated into the shelters of the Dordogne, and graphite and ochre have been found in their hearths, but no trace of Solutrean painting has come to light as yet, while possible ex-

amples of engraving are confined to the figure of a mammoth sculptured in relief on ivory from Prědmost, and the carvings at Bourdeilles. These, however, may have been the work of surviving Aurignacians.

With the establishment of the Magdalenian culture, engraving and painting came into their own again and speedily revealed a complete mastery of the technique and media of representation. Engraving was less common in the beginning of the later part of the period, when attention was concentrated more and more on polychrome painting of animals in the dark recesses of the caves, sometimes almost life size. Thus at Font de Gaume, the great cavern situated on a promontory off the Sarlat road, just outside Les Eyzies, there are no less than eighty magnificent reproductions of animals in various attitudes, painted in polychrome, showing artistic appreciation. On the Spanish side of the Pyrenees, the vigorous and realistic figures of bison on the roof of the cave called Altamira, near the quaint village of Santillana del Mar, must have been drawn by men lying on their backs, like

Michael Angelo painting the Sistine chapel.

It was, in fact, the realism of these Altamira paintings that led to the discovery of cave art, nearly fifty years ago. In 1879 a Spanish nobleman of Santander was excavating in the inner chamber of this cavern when his little five-year-old daughter, whom he had taken with him, suddenly exclaimed, "*Toros! Toros!*" (bulls). The child, having wearied of watching her father digging in the floor, wandered about with her candle. Looking up at the low ceiling just above her head, she caught sight of paintings of what she supposed to be bulls. Imagine the astonishment of her father, the Marquis de Sautuola, when, on coming to the spot where she was standing, he saw magnificent polychrome designs, not of bulls, in the modern sense of the word, but of Palæolithic bison!

This epoch-making discovery was too remarkable to gain a ready acceptance, for in those days archæologists were inclined to think of early man as a wild and biting savage devoid of anything approaching an æsthetic sense. Fifteen years later, however, the discovery was confirmed by the finding

of the less spectacular engravings and paintings in the cave of La Mouthe. It was no longer possible to explain away the Altamira bison, and the Abbé Breuil and others, supported by Prince Albert of Monaco, began a systematic search for further decorated caves, with the result that hundreds of examples have been found in the Dordogne (mainly around Les Eyzies), in Corrèze, in the Pyrenees, especially in Ariège, on the Spanish side, and in Cantabria and the province of Burgos. As has been explained, the representations in the shallow shelters of Eastern and Southern Spain present a different style of art, but there is reason to think that they too, in their Late Capsian form, may be equivalent to the Early Middle and Late French Magdalenian designs. The first stage of this style is composed mainly of large, well-drawn monochromes, with shading and linear designs appearing toward the middle of the period. Then came the polychromes, as in the Late Magdalenian, and finally, just as technique suddenly declined in France before the close of the Palæolithic, so the Capsian underwent

decadence and conventionalization in the beginning of the transitional period which immediately succeeded the Palæolithic.

Nevertheless, there is a very marked difference in execution between the two “schools.” Thus, for example, in the Capsian scenes human figures are almost as numerous as those of animals, whereas in the Magdalenian paintings there are no genuine human portrayals, the few “anthropomorphic” figures being fantastic masked representations, half human, half animal, as in the recently discovered cave called the Trois Frères. In a small alcove at the end of a long passage, amid an array of engravings of all kinds of Pleistocene animals, the strange design occurs. It is partly painted and partly engraved, having the body of a man in profile, clothed in the skin of an animal, the head hidden under a mask with a long beard and great antlers, and the back ending in a horse’s tail. This terrifying object is represented in the attitude of a hunter creeping along with bent knees seeking his prey. In front of it is a sort of balcony at the end of the passage, and Mr. Burkitt thinks

that here an audience assembled to witness some form of ceremonial ritual, while M. Max Bégouën—who with his brother Louis and a friend were the first people to enter the cave after it was blocked up by a landslide in the Magdalenian—regards the image as a portrait of the Great Spirit of the chase, the protector of the clan.

Palæolithic Sanctuaries—This is by no means the only indication that the decorated caves were in reality “prehistoric sanctuaries,” as Doctor Marett has aptly termed them. If they were originally art galleries, it is inconceivable that the designs would be drawn in the remotest and most inaccessible parts of a cave, where they must have been quite invisible to the artists. Thus, for instance, at Pasiega, near the Cantabrian spa, Puente Viesgo, the explorer has to slide down a wall 6 ft. deep, scramble along a long, winding passage, and squeeze his way through a narrow fissure, before he reaches the gallery containing the designs, numbering 250 paintings and thirty-six engravings of deer, horses, bison, stags, ibex, and chamois. It is unthinkable that he would

have continued to frequent this perilous and inaccessible labyrinth in the heart of the mountains from Aurignacian times to the end of the Magdalenian, unless he had some very important reason for so doing. “Art for art’s sake” would not have lured him into these dark and treacherous paths, difficult enough for us moderns to traverse, with our powerful lights, but incredibly more so when only flickering lamps were available.

Again, when the actual designs themselves are studied, it becomes evident that they were executed for practical reasons connected with the control of the chase by imitative magic. The primitive mind is apparently unable to distinguish between a portrait and the person or thing represented, both for him being parts of the same individual. Therefore, if you act upon one you produce a like result in the other. This way of reasoning is known as “imitative magic,” because a real act is supposed to result from an imitative act. Thus certain shells like the cowrie suggested the idea of maternity, for obvious reasons, while the figure of a woman

with her characteristic features unduly emphasized would naturally become a symbol of fertility, motherhood, and life-giving power, woman being the mother of the human race. In the cave paintings the same principle may be observed as in the Aurignacian statuettes, but directed to the destruction instead of the conservation and promotion of life. To the hunter it must have been apparent that loss of blood produced faintness, unconsciousness, and ultimately death in man and beast alike. From this observation it would be an easy deduction that blood is the essence of life, and the heart the centre of vitality. Therefore, according to the theory of imitative magic, it is possible to bring success in the chase by making a representation of the animals hunted and marking them with darts and arrows in the vital spot.

Such figures occur in considerable numbers in the cave designs, as, for example, at the cavern named Niaux, situated near the picturesque village of Tarascon in Ariège (not to be confused with the better known Tarascon between Avignon and Arles, asso-

ciated with the immortal fame of Tartarin). Here are figures of bison with arrows in their sides, in a gallery more than half a mile from the entrance, protected from the gaze of all but the really zealous by a forbidding lake only to be crossed by wading ankle deep in icy water, except in very dry weather. In one of these designs the wounded animal is shown in the act of expiring, with numerous missiles in front in the form of dots and club-shaped markings. In another place in this cave three hollows on the ground have been utilized as wounds by drawing around them the outline of a bison and annexing little arrows to the cups. The arrows are usually painted in red, the colour of blood, the rest of the designs being in black. Red ochre, the equivalent of blood, has the advantage of being more durable, and therefore it was employed doubtless to give greater magical efficacy to the image.

Similarly certain spots seem to have been regarded as particularly sacred in these cavern sanctuaries, which probably accounts for the frequent occurrence of one drawing on top of the other, despite the fact that

there is generally plenty of wall space available. Some of the finest paintings have been ruined in this way, but if they were designed for magical purposes, all that mattered to the original magicians was to function at the propitious spot, however inconvenient it might be. Thus at Font de Gaume, where polychrome paintings frequently occur one above the other, there is a remarkable representation of a rhinoceros in red, high up on the left wall of an inner sanctuary beyond a narrow opening called the Rubicon. Now no artist for æsthetic motives would have climbed an almost vertical wall to the height of 10 ft. to execute frescoes which can only just be seen to-day by skilfully arranged electric lighting, and which must have been quite invisible to the original painters. Surely here is a clear case of a magical motive.

Bison of Clay—The same applies to the clay models of animals recently found by M. Casteret in a cave at Montespan in the south of France, containing thrusts made by spears on the neck and chest. To reach the entrance he swam for the distance of nearly

a mile in the icy water of a subterranean stream flowing through the cavern, passing even through the neck of a siphon under water, clad only in bathing attire, and carrying a candle and matches in a rubber case. In one place, in fact, the ceiling was so low as to be completely under water. If similar conditions prevailed in Palæolithic times, it can hardly have been anything less than a supernatural reason that led men thither to make and mar models of bison, bears, horses, and lions. Almost equally inaccessible is the cave of Tuc d'Audobert, near St. Girons in Ariège, which has to be entered by a boat and an undignified scramble up into the outer chamber. But this is only the beginning of athletic feats. A narrow passage containing Magdalenian engravings has to be tackled next, and this leads to a more remote chamber with earlier engravings. Here in October, 1912, the two sons of Professor Bégouën, Max and Louis, with their friend François Camel, hacked their way through stalactite pillars and quantities of débris resulting from a Palæolithic landslide and reached a gallery containing wall carvings

and the marks of the naked feet of the original hunters who had last resorted thither. In an inner sanctuary they came upon carefully modelled figures of a male and female bison in clay, 24 in. long, leaning against a boulder; with two models lying close by on the floor. Around a small clay hillock there were marks which are thought to have been made by human heels during a sacred dance.

The Sacred Dance—Here, then, as at Trois Frères, is another indication that early man danced out his religion, and it is further corroborated by lancing figures wearing animal masks in the cave paintings at Abri Mège in the Dordogne, while in a Magdalenian site at Lourdes there is a man-like figure with a horse's head. Masking as animals is an important feature in magical ceremonial and dramatic representation among modern primitive people, and it appears to have been one of the means adopted by Palæolithic man to control the chase. Of course it does not follow that he was devoid of the æsthetic sense merely because it was a practical magico-religious

motive that led him into the dark and inaccessible recesses of his cavern sanctuaries. This, however, is a question which we shall have to discuss in greater detail in the next chapter.

Our chief concern here has been to examine the early types of *Homo sapiens* inhabiting Europe after the last complete (Würm) glaciation, beginning with the so-called Grimaldi people whom we think may have brought the Aurignacian culture with them from North Africa. Contemporary with this type were the tall Crô-Magnons, with their well-shaped, long, narrow, low-crowned heads, living about this time in France, Northern Spain, the Riviera, England, and, in the Magdalenian, as far north as Obercassel, near Bonn in Germany. A third sub-group has now been recognized in certain Palæolithic skulls from Moravia, Bohemia, and Combe Capelle in France, characterized by shorter stature and great height of head. They are difficult to place, but they may have same connection with the new migration which seems to have passed along the Danube Valley from the

east into Central Europe and France in pursuit of the wild horse, and was responsible for the introduction of the Solutrean flint culture. After reigning supreme for a while, they appear to have returned whence they came with a change of climate, just as the Magdalenians disappeared with the reindeer when the ice retreated for the last time at the end of the Palæolithic, probably about 6500 B.C. Whither the men of the Old Stone Age went at the end of their long sojourn in Europe it is difficult to say. Professor Sollas thinks the Magdalenians made their way to Siberia, where they became the forerunners of the Eskimos, but while there are similarities between the two "reindeer people," and the Magdalenian skeleton found at Chancelade in the Dordogne reveals certain physical affinities with the Eskimo, yet there are serious geographical and other difficulties involved in accepting this attractive theory. But wherever they went, their passage seems to have been from the southern slopes of the Pyrenees in a northerly direction. They belonged, however, essentially to France, and especially to

Ariège and the Dordogne, though they seem to have made occasional expeditions as far north as England, residing during their stay among us at Kent's Cavern, Torquay, and perhaps at Cresswell Crags in Derbyshire.

The Epipalæolithic Period—Meanwhile other races were penetrating Europe from the south. Thus although the Rochers Rouges caves were inhabited from the Aurignacian onward, the Magdalenians do not appear to have known these fine red cliffs on the Italian frontier, there being no trace of their culture or that of the Solutrean in the deposits. At Grotte des Enfants the Aurignacian culture was apparently followed by a new industry, called *Azilian-Tardenoisean*, characterized by much smaller flint tools, which tend to become tinier and tinier, till in the upper layers they are “microlithic,” like those found in the type station at the ancient French castle of Fère-en-Tardenois in the province of Aisne. These “pygmy flints,” as they are often called, have a distribution extending through Egypt and Syria to India and beyond, yet, so far as Europe is concerned,

they seem to represent a definite culture which entered the continent from Africa at the end of the Old Stone Age and spread through Central and Eastern Spain, across the Pyrenees into France, where it encountered another culture deriving its name from the type station at Mas d'Azil near St. Girons, in Ariège. This Azilian industry represents in some respects a degeneration of the Capsian, and at the same time reveals certain affinities with the Magdalenian.

It is not improbable that the Tardenoisean culture developed from the Aurignacian, which, as we have seen, was also related to the Capsian. In other words, the old long-headed Capsians became the Tardenoiseans. The Azilian proper has not been found south of the Pyrenees, and it may represent an amalgamation of Late Capsian culture from Spain combined with remnants of the Magdalenian. It was probably the Tardenoiseans who took the place of the original Crô-Magnons and Combe Capelle types in Europe, and in a measure carried on their characters, especially in the case of the last-named variety. This may explain why

some of the features of the original Palæolithic races can be still discerned in the modern inhabitants of the Dordogne and elsewhere. Menton would be a likely place for migrations to meet, and possibly here the Late Capsians from Spain combined with the more northerly Azilians, who in their turn had affinities with the Magdalenians. But, in any case, the Magdalenians themselves do not seem to have inhabited these caves.

The Coming of New Races—The end of the Old Stone Age marks the conclusion of the first epoch in the life of *Homo sapiens*, but there is no indication that a definite break in racial type occurred, as at the end of the Würm glaciation. The Grimaldi people may have become specialized as African Negroids, while both the Combe-Capelle and Crô-Magnon types survive in the modern population in certain districts like the Dordogne. The Azilian-Tardenoisean folk seem to have undergone changes in their appearance as well as in their culture during the transitional or Epipalæolithic period, but they remained a long-headed people with

a longer-shaped face than the Crô-Magnons. During their occupation the first representatives of a round-headed, thick-set race with brown hair and gray to brown eyes began to appear in Central Europe, coming probably from Asia Minor, and settled in the Alpine region, which ever since has been the home of men of this type. They apparently made their way westward along the north of the Alps at an early period, and reached Belgium while the Magdalenians were retreating with the reindeer and the ice. In the neighbourhood of the Baltic were long-headed people, and these in process of time became what is known as the Nordic race, having absorbed various contributions from the Azilian-Tardenoiseans and the survivors of the Combe-Capelle group in the Central and Eastern plains. In the South another type became specialized as the Mediterranean race, which again seems to have absorbed elements from the Combe-Capelle stock, together with those of the Capsian-Grimaldi type. Both Nordics and Mediterraneans are long-headed, but the Southerners have modified this feature considerably, and

with a rounding of the head has come a darkening in colouring. The old division of the early inhabitants of Europe into Mediterraneans, Alpines, and Nordics therefore still holds, but as knowledge increases it becomes clearer that, while there has been considerable modification of the racial types through subsequent migrations, the original Palæolithic varieties of *Homo sapiens* are nevertheless really ancestral to modern man.

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HUMAN MENTALITY

IN THE foregoing pages we have confined our attention to the actual remains of early man and the works of his hands which have survived the ravages of time, for in all sciences which rest on observation the proper course is to proceed from the particular to the general, from the known and concrete to the more abstract conclusions which may be legitimately inferred from the evidence. To trace the evolution of human organism as a rational being from the earliest times, and to understand in some measure the complex workings of his mind, it is of primary importance to study with care the archæological data. The modern races still living in a more or less primitive state of culture, as the Australian aborigines, can help us in this quest to a limited extent, but they

are primitive only in a relative sense. That is to say, they are primitive by comparison with ourselves, but inasmuch as they have a history behind them extending over much the same length of time as that of our own, they are not truly Palæolithic, and certainly not primeval. Moreover, in their long period of isolation they have been liable to degeneration, though lowness in the scale of humanity is not necessarily a mark of degradation. Where material culture has undergone very little change it may be assumed, for purposes of illustration, that the characteristic features of the mentality of the people have not altered to any appreciable extent, but, as Rivers has shown, useful arts such as the making of the canoe, the bow and arrow, and pottery, have disappeared in an isolated area like Oceania. Therefore, in employing the savage as a human document great care and discretion have to be exercised. Consequently, in tracing the evolution and final triumph of the human mind the archæological evidence is the safest guide, though the customs and beliefs of modern races in a primitive state of culture may be legiti-

mately used to supply a motive for the actions performed.

Primitive Mentality—First of all, then, let us try to get some idea of the workings of the primitive mind, and see how far, if at all, it differs from our own mentality. This is especially important since the French social anthropologists of the school of Lévy-Bruhl and Durkheim maintain that the human race passed through a “pre-logical” stage of development before it attained to its present power to think in a rational manner. Thus they hold that because primitive people behave differently from ourselves they must be illogical and incapable of distinguishing between the objective qualities of an object and the subjective reactions. Everything is permeated by forces, influences, and actions which, though imperceptible to sense, are nevertheless real. Consequently, the world of fact becomes full of mystery. They think in terms of collective representations in which objects are not divided from one another, but united in a bond so intimate that each participates in the other, making a thing what it is not.

By this "law of participation" is explained how one and the same entity may be simultaneously present in many places, and how one object can act on another by imitative magic. Thus they conclude that primitive people are in a state of pre-logical mentality.

On this hypothesis, it is assumed that a man believes himself to be both a man and an animal, the symbiosis being strengthened by sacred dances and similar rites in which frequently he disguises himself as the animal species by a mask or other symbol and represents its gestures. But if he is unaware of this distinction, he can hardly be illogical if he regards himself as some other creature. In fact, from all we know of primitive people, however absurd their beliefs and practices may seem to us, they are really both rational and intelligible. That they are swayed by emotion and impulse and mistaken in their premises cannot be doubted, but this is because their premises, and not their logic, differ materially from our own. Though we are not always ready to admit it, yet actually our mental resemblances to early man are more numerous than our differences from

him, our fundamental ideas being very largely part of the inheritance transmitted to us from our prehistoric forefathers, who slowly acquired them by experience, intuition, and cultural contact. Civilization is essentially the result of a communication and an elaboration of ideas finding expression in cultural advances. It is only by the successive testing of hypotheses and the rejection of the false that truth is at last elicited, what we call truth being merely the hypothesis which is found to work best.

Unquestionably the primitive mind did not draw the same sharp distinction between a portrait and the object represented as we do to-day, but there is no reason to think that early man was incapable of realizing that nothing can be at once A and also B which is other than A. Then the world was regarded as much more full of mystery than it is now, and permeated with forces and influences and actions which, though imperceptible to sense, were thought of as real; but it is only a very crude type of mind, characteristic of the Nineteenth Century,

that is governed exclusively by the notion of mechanical causation.

Magic—When the Magdalenians resorted to the innermost recesses of their cavern sanctuaries, to perform magico-religious rites in the hope of thereby controlling the fortunes of the chase, they did so because their notions of cause and effect was different from ours. They attributed every event which arrested their attention or demanded an explanation to supernatural agencies. Cause and effect and agent and act were not clearly differentiated, not from lack of logic, but from an imperfect understanding of natural laws and processes. So apparently they danced out their religion and made their sacred designs in the most inaccessible spots because they were regarded as supernaturally potent, and in the belief that by so doing the animals depicted would fall under the power of the hunter by reason of the spell that had been cast upon them.

The Aesthetic Sense—This, however, is not to deny that the Palæolithic painter or sculptor was devoid of the artistic sense merely because he happened to be accen-

tuated by practical magico-religious motives. A work of art is the embodiment of a feeling, a mood, or a point of view not purely ethical or intellectual; an expression of the inner quality of life, of intuition capable of observing things unrecognizable to one not having this sensibility. The artist, unlike the camera, selects certain aspects of an object for emphasis, distinguishing subconsciously the essential from the trivial or irrelevant, and thus creates a representation of it in line, colour, or movement, in a series of relationships which he appreciates and enjoys. With scientific accuracy he is not concerned. Nor is it the intention of the artist, *qua* artist, to convey knowledge as such, although he does so. In painting a landscape it is the impression made by the scene upon his mind that he reproduces, and its artistic merit depends on the æsthetic value of that impression. Even in a portrait, where reproduction of the original is essential, it is still the impression on the artist's mind—"catching the likeness," as we say—that makes a work of art an externalization of the sitter's personality.

All art is not equally significant. Much, of course, depends on the artist's degree of mastery of the technique and media of representation. In its earliest stages, as revealed by the Aurignacian designs, cave drawings were mostly badly proportioned scribblings, like those of children learning to draw. The animal is generally depicted in profile, having only two legs, but the horns are represented as if viewed from the front. The head is too small for the body, and the hind parts are omitted. Nevertheless, they show vigour and powers of observation, and if the Cap-sian paintings really belonged to an early period, they illustrate this intense vitality and vigorous action. The earliest engravings are little more than heavy wavy lines, made perhaps with the fingers or some forked instrument, but the sculptured figures, sometimes in relief, are very skilfully modelled, though not finished works of art.

It is, however, in the great polychrome paintings of the Magdalenians that the æsthetic sense is demonstrated beyond any manner of doubt. Thus at Font de Gaume there are no less than eighty magnificent

reproductions of animals in various attitudes showing real artistic appreciation, and the same applies to the Altamira bison and many other similar examples in the caves decorated with Magdalenian polychromes. On the walls of the long, narrow passage which constitute the Combarelles grotto, about a mile from Font de Gaume, there are engravings of small horses so accurate in outline that zoölogists have been able to determine their breeds. At Limeuil, in the Dordogne, there is a fine representation of a browsing reindeer, and a file of reindeer are shown at La Madeleine, and at Lorthet, Haute Pyrénées. A herd of reindeer with leaders are designed on the wing-bone of an eagle from Le Mairie, Dordogne, while attempts at perspective are to be seen in the herd of horses engraved in stone from the cave of Chaffaud, Vienne. Sculpture in the round continued in this period, but soon gave way to decorative sculpture, usually in high relief, as in the case of the clay bison at Tuc d'Audoubert (now in the museum at Toulouse), beautifully modelled and full of energy. Magdalenian engraving on bone,

horn, and ivory shows an even greater mastery of the technique and media of representation.

In view of this evidence, it can hardly be denied that there were a number of true artists among the producers of the Magdalenian mobiliary and mural art, who were not only intuitive observers and splendid draughtsmen, but also gifted with a real æsthetic sense and the skill to portray beauty. That the motive was not "art for art's sake" does not prevent their being works of art unless we are prepared to exclude from our galleries to-day all pictures painted for the practical purpose of enabling the artist to earn a livelihood, or for religious and commercial requirements. Then, as now, although the disinterested desire to create the beautiful was not the primary concern, there is no reason to deny that the artist found æsthetic delight in his work. It may be that realism came to be regarded as having a magical value, but it certainly was not so in Aurignacian. Probably if the belief obtained among the Magdalenians, it was only fostered by the skill of the artists.

The Religious Emotion—The same conclusions probably apply to the religious impulse. While it was undoubtedly mainly directed at first to practical ends in the employment of magical devices to assist in the struggle for existence, yet primitive people soon come to the end of their emotional tether. There appears to be a tendency in the human mind, both primitive and civilized, to ascribe to natural causes phenomena with which it is familiar, and to look upon other phenomena—the unfamiliar and mysterious—as “supernatural,” or at least as springing from supernatural causes. The germ of this distinction occurs even among animals, for the horse shies at an unfamiliar object on the road, and dogs often slink under a table during a thunderstorm. It is this sense of the uncanny which in man passes into that of wonder and religious awe—the *mysterium tremendum* as it has been called—and finds expression in the cry, “How dreadful is this place!” In the animal world it would seem to stop at mere gruesomeness, but in man it is not only felt, but given a valuation, calling forth the notion of

sacredness, worship, and God. Thus man is essentially a *religious* being.

As the lightning shivered the trees and the thunder crashed amid torrential rains, early man doubtless felt himself in the presence of a Power which he did not understand. He became aware of a transcendent Something which he could not explain, and so he postulated the existence of a "not himself" that is alive. In the beginning the question as to whether this living Reality behind and within the universe should be called "He" or "It" is not very likely to have arisen. Overcome emotionally by the awesomeness of nature, as his sense of wonder deepened, he became aware of the supernatural spontaneously, and gave it such valuation as he was able. So he "pictured" God to himself, as it were, in various natural forms and objects. With the realization of his own personality he would think of the supernatural in terms of spiritual beings, systematizing it and expressing it in intellectual concepts both rational and personal. In this animistic and theistic phase of religious development every extraordinary event that called for the

help of an intervening agent provided an impetus to penetrate more deeply into the nature of the supernatural powers and to establish a more intimate alliance with them.

Magic and Religion—This attitude to the mystic force behind the world of Nature was at first probably “magico-religious,” inasmuch as it found expression, on the one hand, in the use of charms, amulets, and other magical instruments for purely practical reasons, while on the other hand it called forth the religious concept of non-moral holiness, the “numinous,” as Otto terms it, which gave rise to the belief in powers superior to man, thought to direct and control the course of Nature and of human life. Nevertheless, there is a very real distinction between magic and religion, as fundamental as that between the conception of a “house” and a “home,” or a soldier and a murderer. A row of houses may have the same appearance, but to the occupants one is differentiated from the rest because it is the place of their family abode. For them the difference is as real as the difference between killing and murder.

Similarly it is the mental attitude of the priest and of the magician which determines the psychological significance of the rites and makes them what they are, viz., magic or religion. Magic is essentially a human possession exercised by the magician through his own inherent powers, by definitely prescribed rites having for their purpose certain practical ends. Conversely the priest, acting on behalf of religion, supplicates the super-human powers as their agent, seeking their aid by prayer and sacrifice in the accomplishment of those things beyond human endeavour. The *modus operandi* may often be the same in the two disciplines, but the ends to which the things done or said are applied are totally different.

While there is no justification for the assumption of Sir James Frazer that originally an age of pure magic preceded an age of religion, the priest being the linear successor of the medicine man as "the fallacy of magic becomes more and more apparent to the acuter minds and is slowly displaced by religion," it is nevertheless true that magic does play a more prominent part in primi-

tive society than in a modern civilized community. Moreover, the two methods of approach to the sacred very often exist side by side in the same rite. The tendency of primitive man is to "dance out his religion," as Doctor Marett has aptly put it. In other words, the hopes, fears, and passions which lie deep down in the unconscious mind of the community are expressed symbolically, and in this process magic and religion are closely fused. The primitive mind is unable to separate or analyze out particular elements from the whole. To the cultured on-lookers, a long and complicated savage ceremony may suggest many underlying conceptions, but to the natives themselves it appears as the "outward and visible sign" of one inward desire and purpose. The rite as a whole is felt to be in some mystic way effective in bringing about the result for which it is performed, ritual being the expression of thought and a vent of pent-up emotions and activity. The savage is essentially a man of action, and therefore he usually acts before he thinks, and when he does think out the whys and wherefores of a

situation he translates his thoughts into representative actions.

Thus it would seem that the Magdalenians, like their modern counterparts, probably performed dramatic hunting rites in their cavern sanctuaries for similar reasons, masquerading as animals and dancing the appropriate ritual dances. Again, the dancing women, clad in huge hats and crinoline skirts, represented in the rock shelters at Cogul and Alpera and elsewhere in Eastern and Southern Spain, which may be the work of the Capsians, recall a sacred dance at the initiation of novices into the secret societies called the *duk-duk* in New Britain.

It has been suggested that the tectiform designs found in some of the decorated caves—as, for example, at Pasiega in North Spain—were connected with the practice of Totemism, an institution based on a supposed kinship between certain species of animals, plants, or other objects and human groups. But although the absence of the bones of the animals depicted on the walls in the refuse heaps at the entrance might suggest that the species were tabu, the existence of

so many different varieties of animals in one cave is against this interpretation, for each totem group would presumably have had its own sanctuary. Much more probable is it that early man resorted to the sacred decorated caves to control the chase and get supernatural strength by ritual dances, while he may also have drawn representations of the human hand on the walls, as at Gargas, as a protection against malign influences, for similar designs are used for this purpose in Morocco and elsewhere to ward off the Evil Eye.

From this evidence it seems that early man lived in a supernatural environment, but it does not in the least follow that he was therefore illogical. He was probably much more impulsive, much more easily swayed by his emotions than we are, but being a child of Nature, he reacted to his surroundings in a purely natural way, both intellectually and emotionally. He was neither "high-brow" nor fantastic, his actions and outlook differing from ours only in the premises from which they proceeded. True, we know very little indeed about the

actual beginnings of the human race, but such evidence as we have reveals a ground-work of logic, reason, and religious emotion comparable to our own in its essential operations. The absence of any definite traces of art in the Middle and Lower Palæolithic may indicate that the æsthetic sense belongs exclusively to *Homo sapiens*, but however this may be, it is clear that *Homo Neanderthalensis* was not devoid of religious emotion.

The Concept of Immortality—The ceremonial interments found at Le Moustier, La Ferrassie, and La Chapelle-aux-Saints, described in the last chapter, show that cave man was led to ask the eternal question, “If a man die, shall he live again?” as his companions one by one fell into “the sleep that knows no waking.” Professor Macalister visualizes the scene in this way: “As they sat round the fires and discussed this momentous problem one would tell of a dream that he had had in which the dead had appeared to him; another would relate how something, he knew not what, but which surely was not of the common things in Nature, had startled him when he was wan-

dering abroad in the gloom of the forest. With the weird, dancing shadows cast by the fire on the rocky walls of their cave, with the wild noises of nocturnal Nature all around them, small wonder that they found to their question an affirmative answer. Already even the lowly Mousterian man, degenerate though he may have been, was conscious of something more than merely animal within him: already he had begun to look forward to a life beyond the grave—a life like that to which he was accustomed, for he could conceive of none other, where he would need food and clothing and the instruments for procuring them. As his comrades passed, each in his turn, into the silent land, he laid beside their bodies such things as he imagined would minister to their necessities in the mysterious otherworld."

Professor Macalister is inclined to think that it was cave life that first aroused the religious emotion, but in the freer life of the Lower Palæolithic, when man roamed over the plains and beside the rivers, and found his food with comparative ease, there was less to direct his attention to the super-

natural world. There can be little doubt that in the harder life of the Würm glaciation, when the Mousterians were driven for shelter into the gloomy and awe-inspiring caves, which resounded perhaps with the fluttering of bats and with the shrieks of owls, the thoughts of the people would inevitably become turned to the terrors of the Unseen. But, as we have seen, the Mousterian culture phase was not confined to the last glaciation, and the presence of a *coup-de-poing* implement in the ceremonial interment of Le Moustier suggests that the youth was laid to rest in the earlier part of the period when the weather was still clement. From this it would appear that the notion of a life after death was independent of glacial conditions, though the burials at La Chapelle-aux-Saints and La Ferrassie, both of which belong to the Middle Mousterian (the former being associated with the remains of the cold-loving woolly rhinoceros), show that the belief still persisted when the ice reappeared. If the two skeletons found at Spy were interred in a similar manner, they reveal that the practice went on to the last part of the

period. With the coming of *Homo sapiens* in the milder days of the Aurignacian, definite attempts were made to revivify the dead by burying them in red earth, apparently the surrogate of the life-giving blood, and adorning the bodies with shells endowed with similar properties. From then onward the cult of the dead became an integral part of human culture which was destined to play an important function in the evolution of civilization, especially in Ancient Egypt. At present we have no evidence of ceremonial interments prior to the Mousterian culture phase, but possibly this may be accounted for by the fact that the earliest human remains have been found in river drift gravel in a fragmentary condition.

The Development of the Brain—In view of the existence of *Eoanthropus*, with a brain case having a marked similarity to that of *Homo sapiens*, in a period almost certainly anterior to that of the Neanderthal type, it would be illogical to suppose that the apparently intellectually superior Piltdown race was necessarily inferior to its successors in respect of religious emotions. The brain

of the "dawn man," though small, comes definitely within the range of variation in size found in modern man. Of course mere volume of brain is not the only criterion of mental superiority, but, as Elliot Smith has shown, a brain must reach a certain size and weight—950 grammes, or 1,000 c.c. in volume—before it can be the seat of human intelligence. Growth in volume continues till a certain maximum weight is reached; then *development* takes the place of growth, the brain elements entering into more and more complex relations with each other without much increase in size and number.

We now know that it is the pre-frontal region (*i.e.*, the front part forming the forehead) that the higher mental faculties are centred, and consequently stupidity and dementia follow from the degeneration of this area. In spite of the complexity of the spinal cord, and still more of the medulla and cerebellum, no process confined to these structures involves human consciousness. True conscious psychical activity belongs to the fore-brain, and almost entirely to the

folded layers of gray matter covering the cerebral hemispheres—the so-called cerebral cortex. In *Pithecanthropus* this region was undeveloped, showing that the creature was of low intelligence, and in the Neanderthals it is not fully developed, having a protuberance as in the brain of the anthropoids. The left frontal lobe in particular, which is associated with the power of speech, is not much developed in the lower part, so that probably the cave men had a limited power of speech. In *Homo sapiens* the inferior or third frontal convolution is expanded so as to reach back to the stem of what is called the fissure of Sylvius, forming the anterior boundary of the stem, this new orbital part of the frontal lobe being associated with the faculty of speech. In Sir Arthur Keith's reconstruction of the Piltdown brain, the third frontal convolution reaches the human standard, and it is even more prominent in Sir Smith Woodward's cast. Therefore, while some of the parts which develop latest in ourselves were defective in *Eoanthropus*, he was nevertheless far removed not only

from the "dumb animals," including the gorilla and even *Pithecanthropus*, but also from *Homo Neanderthalensis*.

In view of these somewhat technical anatomical facts, the Piltdown race is seen to be quite definitely human, and if we are compelled to grant the religious emotion to the cave man, it would be illogical to suppose, in the absence of definite evidence to the contrary, that the earlier species, possessing a brain in so many ways like our own, was inferior in this respect. Religion, therefore, was practised in all probability in the Lower Palæolithic, and it may have been part of the original endowment of mankind, though at present we have no positive evidence before the time of the Mousterians.

Observation and Invention—Less obscure are the beginnings of scientific knowledge, for it is clear that our earliest ancestors had powers of observation, adaptation, and inventive skill. Starting with a stone in its natural state as the only available tool and weapon, man soon discovered a way to make it more effective by chipping it to the required shape, and finally of beautifying it

in form and perfecting it by polishing. In all the multitude of implements used in the chase and in domestic life, we have a permanent record of a continuous progress in invention and use, and also an adaptation of new material, stone having been employed where flint was not obtainable. Later such substances as bone, ivory, jadeite, copper, bronze, and iron were found to be more serviceable, and so gradually replaced flint, stone, and wood. Beginning *de novo*, without any knowledge of Nature, with no theory of social order, and surrounded by creatures of infinitely greater physical strength than himself, man was compelled to dig and delve and reënforce his weapons by his wits for the preservation of life. Food had to be obtained somehow, and if a stone was unequal to the task, other methods had to be devised. As the cold increased with the advent of a glaciation, he became aware of his nakedness, and if not ashamed, at least he was distinctly uncomfortable. So he learned to clothe himself with the skins of the animals he had previously found ways of killing, and this necessitated the invention or adaptation

of new tools. It also probably led him to tame the fire "dragon," as he doubtless regarded the phenomenon at first, so that it could be used for the comfort and safety of those who employed it aright.

Fire—Exactly how and when this was accomplished we do not know. The occurrence of flints showing traces of fire in the Red Crag deposits of East Anglia has led some archæologists to conclude that its use goes back to the Pliocene Period of the Tertiary Era, but the first hearths do not occur till the Acheulean culture phase. From this time onward fires at the entrance to the caves appear to have been a regular part of the equipment of a household, but how they were kindled is a mystery. It may have been through accidental conflagrations due to sparks flying about in the production of flint implements, and in some districts perhaps through volcanic action. In an Early Moustierian cavern on the north coast of Jersey, called La Cotte de St. Ouen, a lump of iron pyrites has been found, and if two such pieces were knocked together an excellent spark would be obtained. If it fell on dry

leaves it would very likely set them alight, and an accident of this kind may have inspired some observant genius to try and repeat the operation. Or the heat generated when dry branches of trees are rubbed together by wind may have given a clue to the process of fire-making by friction, just as primitive people to-day will rub a blunt pointed stick in a groove made in a piece of wood till the dust is ignited. But whatever the method may have been, it is certain that the discovery had been made by the time of the Mousterians, if not earlier, and clearly it presupposes considerable powers of observation, experiment, and adaptation; for even if at first the burning ashes from forest fires were carried to the habitation, they would go out sooner or later, necessitating the invention of some method of rekindling. Moreover, the charred bones suggest that the art of cooking was known in Palæolithic times.

The cave fire became also a social centre, a promoter of intercourse and language which made an exchange of ideas possible; an achievement reacting on his creative powers. Thus human thought and activity

were knit together, as man became more and more sociable, working with and for his family and his fellows in the maintenance of everyday requirements. Gradually he mastered the forces of Nature and of the social order, one idea or invention leading to another, till, as knowledge increased and his outlook widened, he became skilled in the industrial arts, the conduct of the chase, and the organization of the community. If early man at all resembled the surviving races in a primitive state of culture, he was able to read the news of the countryside with remarkable precision, distinguishing the footprints of animals, and eventually tracking them to their lairs. In Australia even a child will say how many men have been along a track and how long ago; he will know the peculiarities of every bush and tree, which he uses as "sign posts" and "milestones"; he studies the position of the stars so as to find his way home; and he learns to use his ears to locate sounds, to distinguish between the notes of birds, and to catch the faintest rustling of leaves or moving of grass, telling of the approach of

food or danger. He is trained to throw a stone with unerring aim, so that he is able to bring down a bird on the wing, and his powers of physical endurance are such that, when he is fit, a man will run down his prey simply by following its tracks till the animal comes in sight, though he may never have seen it before! It would seem that early man must have been similarly equipped by Nature in order to have gained the mastery over his environment and to have survived.

Mind and Brain—All this bears witness to human achievement and supremacy having been the result of a superior *mental* power and creative intelligence. Mind is apparently very much bigger than brain, and in sense independent of it, but nevertheless the two are so intimately related that the one is in great measure dependent upon the other. Thus an unintelligent person has a poorly developed brain, and any derangement of the nervous tissue inevitably reacts on mental processes. Therefore the more complex the nervous system, the higher will be the mental development. As we have seen, various factors have contributed to the evolu-

tion of human mentality—stereoscopic vision, hearing, the acquisition of speech, and the use of the hands. Through the sense organs all kinds of impressions pour into the brain, and as these are more and more coördinated it becomes possible to grasp simultaneously numerous separate factors, and to retain an image or memory of them for longer and longer periods of time. As Koehler has shown, when food was buried in the sight of different animals overnight, and subsequently all visible traces of the spot were removed, the highest mammals were found to have a longer memory than lower forms. A chimpanzee would go straight to the place the next morning and disinter the remains, while a dog was only capable of remembering the incident for an hour or so, and a hen for a few minutes. Man, on the other hand, having a far more complex cerebral cortex (which is probably the seat of all memory), has tremendous power of recalling the things he has seen and experienced, though even the human memory has its limitations.

Human Mentality—The brain of man differs from all other brains in its power of

growth and complexity—the number of cells in the cerebral cortex having been estimated at 9,200,000,000, and if spread out the structure would only cover about one and a half square feet and five inches in thickness. At birth the brain of an infant weighs only one fifth of its final mass, and, unlike the other vertebrates, it can continue to add to the number of nerve cells after birth. An ape, on the contrary, starts off with two thirds of its full cerebral growth, and therefore has not so much margin for further development. It is just this difference in mental capacity that has enabled man to gain the supremacy, and to exercise creative functions. It has given him, in short, his superior powers, which have found expression in numberless ways, such as art and industry, social organization, and religious experience. Apparently from the beginning he has had inventive, creative, and adaptive faculties peculiar to the human race, for as far back as we can go man gives every appearance of having been an intelligent and thinking being, equipped with a mentality differing only in degree rather than in kind from our

own. Instinct, emotion, and necessity may have figured more conspicuously in prehistoric times than reflective thought, just as with advance in civilization and the adoption of the scientific method more attention has been paid to imitating reality and seeking to direct it, instead of allowing the mind to be influenced almost entirely by subjective impulses and wish fulfilment. But there is no evidence that man's present power to observe, record, and experiment in a rational manner was absent in any stage of human evolution, however different our premises may be in these days of scientific reasoning.

Long before Bacon, Copernicus, Galileo, Kepler, and Newton broke away from the traditional attitude of mind, man had studied Nature with the avowed object of investigating its laws and imitating them. In every age, in fact, there have been some brains more fertile than others, and although the names of many a heaven-born genius will never be recorded in history, the memory of the great inventors, thinkers, and innovators live on in tribal traditions, generally camouflaged

as a culture hero, an ancestor, or an ancient king. But whether remembered or forgotten, their work has made progress possible, and what we now call civilization is but the product of many minds, each adding its quota to the gradually increasing sum of knowledge, spiritual and material. Sometimes the advance has been in a steady upward direction, but generally there has been a sudden "lift," bringing into being a new era, as, for example, in the case of the scientific renaissance in the Seventeenth Century and the subsequent industrial revolution arising out of the new expansion of machinery. This in its turn reacted upon social conditions, so that science organizing industry had its human corresponding to its mechanical side. Nevertheless, the scientific method thus elaborated is really only an extension of Greek ideas, and but a later phase of that unifying process which began when human language first knit men together round the camp fire.

The mind which in the Seventeenth Century A.D. began to read the riddle of the stars and measure the speed of light was the

same as that which in the centuries immediately preceding the Christian Era laid the foundations of Greek geometry and astronomy, from the days of the Ionian Thales of Miletus (*c.* 640–546 B.C.), who is alleged to have predicted the eclipse that took place on May 28, 585 B.C., to the establishment of a scientific astronomy in the school of Alexandria a few centuries later by Aristarchus of Samos and Eratosthenes. Moreover, Thales apparently arrived at his conclusions from data derived from earlier Mesopotamian sources, and the Ahmes papyrus of about 1700 B.C., believed to be founded on much older work, shows that the Egyptians were in possession of certain mathematical laws even at that date. Earlier still, the builders of Stonehenge at the end of the Neolithic or the dawn of the Metal Age (*i.e.*, at the beginning of the third millennium B.C.) apparently had discovered that on the longest day of the year the sun attains its extreme position on the horizon, and directed the axis of their monument accordingly. But, as we have seen, there is no hiatus between the modern ancestral European

races and the Palæolithic varieties of *Homo sapiens*, human brain formation having changed but little since the beginning of the Aurignacian Period. Some races, it is true, have shown greater advances than others, but this has been due to many causes other than purely mental processes. Increased complexity of life and thought has inevitably reacted on the brain and mind as civilization has progressed, but cultural advance marks a difference of degree and not of kind.

While the earlier Neanderthal and Piltown types were unquestionably more primitive in mental structure than any variation of modern man, yet the contrast in cranial formation is immeasurably less than that between the lowest of the fossil forms of man and the highest anthropoids. Without endorsing Doctor Hrdlicka's view that *Homo Neanderthalensis* is ancestral to *Homo sapiens*, it cannot be denied that there are very many points of contact between the two stocks, showing that they are but variations of one species—HOMO. The human race, in short, in whatever state of culture it may be, is always and everywhere clearly differ-

entiated from its mammalian ancestry by being in possession of a human mind, and it is this which is the hallmark of human distinctness.

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Chapter V

THE MAKING OF MAN

HAVING surveyed the array of facts concerning the beginnings of man, it now remains to consider the principles governing human emergence. That mind has been the controlling factor *par excellence* will hardly be disputed, though this was not the only determining agent. In the long upward struggle from the amœba to man we now have to take account of various causes and mechanisms in the origin of species unknown to Darwin and Herbert Spencer. That there has been a sifting on the part of Nature is beyond question, but this process of Natural Selection does not suffice to explain entirely the cause of the *modus operandi* of evolution, as Darwin imagined. True, in a sense it is still the only cause so far discovered, but, nevertheless, it is becoming abundantly clear that other causes await discovery, for inten-

sive research during the last half century has rendered more mysterious instead of elucidating the modes and causes of the onward progressive movement of the germ plasm resulting in the consecutive origin of new adaptive specific forms.

The Modes of the Origin of Species—It now appears that sub-species, or species-in-the-making, are formed in certain isolated areas which remain stable under changed conditions of environment. But if the conditions of the new home are the same as those of the old, no new varieties arise, as, for example, in the case of amphibia. As Professor Osborn has recently shown, species originate through a continuous and creative adaptation in either stable or changing conditions of environment. This evolution is not content merely to reproduce existing forms, but constantly gives rise to new creations possessing higher values and more specialized structures. This ascent is continuous through millions of years, a steady upward progression toward perfection, as fish became amphibia from which land-living reptiles emerged, till they in their turn

developed either wings and soared into the air as birds, or branched off into the stem that produced the mammals at the end of the Triassic Period. Despite their higher organization, the mammals remained small till, in the Tertiary Era, the forerunners of the great mammalian fauna began to appear and gradually assumed their final forms. Over the plains of North America scampered the ancestor of the horse, the four-toed *Eohippus*, standing about a foot high, and with him similar little creatures ancestral to the sheep, pig, ox, and deer, dodging the carnivorous ancestors of the dog. As the marshes gave place to meadows, grazing mammals increased in number, together with insects and birds, till in Oligocene times, when the climate became still drier, and dogs, sabre-toothed cats, and three-toed horses (*Mesohippus*) evolved, these grazing herds extended their borders and increased in size. By the end of the period the Eocene ancestor of the elephant, called *Moeritherium* (which originally was about 3 ft. high), had added a couple of feet to its stature and developed its chin to enable it

to reach the ground, the fleshy covering of the upper jaw becoming more and more trunk-like. But it was in brain rather than bulk that the mammals progressed, the common stock of the anthropoids and man emerging, as we have seen, very early in the Tertiary, and undergoing important changes during the Oligocene Period destined to determine their subsequent course of development.

Heredity—That this great upward movement of life through millions of years, extending from the amœba to man, has come about in great measure through a series of natural processes and biological forces cannot be denied. Throughout the development of organisms there is a continuity of the germ plasm, like tending to beget like, the body of the parent influencing the germ of the next generation in numerous subtle ways. But exactly how far the features acquired during life are passed on to the descendants is very difficult to say. The children of miners do not more readily assume contracted positions than those of parents who work under less cramped conditions, while the offspring

of professional footballers do not usually have extra strong legs. This may be because the germs for the next generation are set apart within the body at an early stage in its life history, as Weismann maintained, and therefore there is no real continuity of germ tissue from generation to generation. Consequently he was led to deny the inheritance of acquired characters.

Natural Selection—Darwin made variation the basis for evolution, and he used it as a peg on which to hang his theory of the origin of species through Natural Selection. In the immortal passage with which he concluded the *Origin of Species* he says, “It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth and Reproduc-

tion; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a struggle for life, and as a consequence to Natural Selection, entailing Divergence of Character and the extinction of less-improved forms. Thus, from the war of Nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved."

Thus Darwin assumed two operative factors in the organic world: (1) Variation in the reproduction and inheritance of living beings, and (2) Natural Selection, or the survival of the fittest, as Herbert Spencer

called it. Of these two, Natural Selection, he thought, was really the determining cause of change, a variation from the standard type being often of such a character as to benefit the individual in some way calculated to make it easier for him to survive. Living longer, he would leave behind more descendants, who would tend to perpetuate the newly acquired characteristics. Thus gradually the new type would become standardized and replace the old. Thus he conceived of Natural Selection as a mechanism capable of producing new species by a multiplication of small variations spread over an immense period of time, very much as a stock breeder produces the variations in his cattle by selective breeding, choosing parents with a view to milk or meat production. In Nature Darwin saw a similar process at work automatically, and subsequent research has in a measure proved that he was right.

Mutations—Thus De Vries has shown by his experiments with evening primroses that many large variations—or *mutations*, as changes resulting in the production of new

species are called—are heritable, but the advance from old to new forms is by way of "leaps" rather than by the slow piling up of small discontinuous variations. Abbot Mendel of Brünn, in the days of Darwin, demonstrated that certain stable characters were often inherited whole, and so provided a clue to "mutational evolution." But Mendelism deals with the results already achieved by evolution, and not with the creative powers by which they are brought into being; it is concerned with the side-tracks rather than with the main cause of development. De Vries's mutation theory, on the other hand, postulates "lifts" or leaps from one generation to the next, instead of a series of minute variations, as Darwin imagined. That mutations do occur when species are transferred to a new environment will hardly be disputed, but it is less certain that this represents the normal cause of evolution. In different geographical areas variations seem to follow different lines, butterflies, for example, reared under cold conditions resembling the Northern varieties, whereas those subjected to a high tempera-

ture conform to the Mediterranean types. Thus a change of environment leads to modifications in species which may become permanent in proportion to the permanence of the new habitat. The evolution of fishes, for instance, which occurred in the warmth of the Carboniferous Period, was followed in the Jurassic by the emergence of reptiles, and of mammals in the Eocene of the Tertiary Era. These new forms seem to be connected with changes in environment, excessive specializing leading to the disappearance of certain species when the conditions were less favourable, as a result of the lowering of the temperature and land submergences. In their place new and higher organisms arose, leaving only a remnant of the earlier forms.

How far variation in individual species is extended to the germ cells is very difficult to determine in the absence of any clear and indisputable case of the passing of individual modifications to the offspring. Yet if the germ cell is entirely isolated from the organism, as Weismann supposes, every individual has to begin at the beginning, ex-

cept in so far as Natural Selection has been at work in the germ cell, enabling the nucleus to derive nourishment from the body cells. It is these well-fed elements in the germ that ultimately determine the course of the resulting variation in the direction to which the individual has thus contributed. Therefore the body of the parent has some influence on the offspring. This explanation is not very convincing, but the fact remains that while there is no definite evidence of the transmission of modifications to descendants, yet disused organs do tend to disappear after generations, just as specialized features recur.

Hormones—It must be admitted, then, that concerning the causes of variations we know very little at present. It may be that some kind of "shuffling of the hereditary cards" takes place at the fertilization of the egg cell, or possibly the modifications of certain bodily characters, continued through many generations, modifies the germ plasm. Again, in recent years biologists have discovered the very important part played in the growth of at least the higher animals

by the endocrine or ductless glands, which extract substances from the blood and discharge them directly into the blood stream as "chemical messengers" or *hormones*, as Professor Starling named them. A part of this elaborate machinery of internal secretion glands in the human body is centred in a small structure known as the pituitary gland, placed in the floor of the skull under the brain. If this becomes enlarged in early youth, the individual develops into a giant, but when it occurs during adult life enlargement of the extremities results, the hands and feet being abnormally large. Glands of this nature also occur on either side of the larynx and upper windpipe, known as the thyroid glands, the secretion of which increases the vitality of the tissues. It is now well known that children suffering from disease of these glands do not develop properly, becoming cretins. Already remarkable cures have been effected in some of these cases by the application of extracts of thyroid, and further study of the ductless glands will doubtless throw much light on the changes in the growth and activities of or-

ganisms in general. It remains to be determined whether, as seems probable, there are analogous influences working through the lower animals and plants. Since there is reason to think that these glands are related to the sex organs, the secretions may affect the germ. The hormones regulate to a considerable degree our whole body, and we now know that the germ cells influence the balance of our bodily activities.

Creative Evolution—There is, however, another way of looking at evolution which is gaining the acceptance of many thinkers to-day. Bergson called attention some years ago to the ceaseless “urge” of life-force, or *élan vital*, in Nature finding its outlet in variation and new forms, which in time builds up the concrete universe within and around us. This force is *creative*, inasmuch as it makes new forms, qualities, and potencies out of those that have gone before. Thus, as Professor Osborn has said, “evolution is a continuous creation of life fitted to a continuously changing world,” a conclusion reached in his case from a careful study of physical adaptations instead of from the

hypothesis of an internal vital impulse. But whether we proceed from principles to facts, like Bergson, or follow Osborn's course from facts to principles, we find that evolution is really the incessant creation of new forms and new combinations of energy in the organic world, resulting in new powers and faculties, which become most conspicuous in man, the last product of the immanent creative life.

As Aristotle maintained, the real nature of a process can only be understood by examining its highest product, and therefore to determine the real significance of evolution it must be viewed from the standpoint of the human world. Now such a convinced pioneer evolutionist as A. R. Wallace, Darwin's magnanimous co-worker, realized that there is something unique about man, equipped with "a spiritual essence or nature." Therefore he sought to show that the mathematical, musical, artistic, and moral faculties could not be accounted for by the Natural Selection of variations. Some "origin wholly distinct from that which has served to account for the animal character-

istics—whether bodily or mental”—some “spiritual influx” was necessary, he thought, to account for his ascent. True, a “calculating boy” can now be adequately explained without postulating a special spiritual influence, and the same applies in lesser degree to the development of artistic, musical, and moral appreciations, but, nevertheless, the “apartness” of man surely is beyond question. Physically the human organism is one with the rest of mammalian life; but spiritually and mentally he is a whole new creation.

In the words of Julian Huxley, “Think of Galileo not resting until he penetrated the mysteries of motion and force; of Jesus or of Gautama not resting until they could find a way of life in which the inner reality of inspiration could be in harmony with the outer reality of the world; of Michel Angelo not resting until he could embody its experience in the complete rightness of artistic expression; of Edison not resting until he could control matter and make it perform his will; in all such men the mind is bending the body to the achievement of ends

which are its own, new, undreamt of by pre-human life." Moreover, this uniqueness is not a product of civilization, for when we first encounter *Homo sapiens* at the beginning of the Aurignacian Period, these moral, intellectual, and spiritual abilities have emerged, and even in the earlier type, *Homo Neanderthalensis*, they are not entirely unknown. Can these human qualities be accounted for by Natural Selection?

The Emergence of Man as a New Creation—Something akin to them may be found in the animal world, but the emergence of man marks a mutation, an abrupt transition in intellectual, moral, and spiritual life, and in this sense the human race may be regarded as a new creation. As Professor Lloyd Morgan has pointed out, just as a combination of two gases, oxygen and hydrogen, results in the production of water, having new properties, or as a chemist creates a new carbon compound by synthesis, so man is something genuinely new. In the words of Browning in *Abt Vogler*: "And I know not if, save in this, such gift be allowed to man. That out of three sounds he frame, not a

fourth sound, but a star." By star poetic stress is laid on the emergent character of "chordiness," which is something genuinely new—an emergent quality over and above the summation of the constituent tones.

The Origin of Life—And, after all, this is precisely what is taking place in the whole scheme of Nature, the advance from one stage to another being by a sort of leap across a stream rather than by a bridge. Thus, while we now know the chemical constitution of the nucleus of the living cell, and chemists have succeeded in building up by synthesis a number of complex organic compounds isolated from living matter, such as a protein like glucose or grape sugar, and nicotine, consisting of thousands of atoms, yet there is no bridge between the living and the non-living, even the stepping-stones being not very clearly defined. It seems that the atoms in these complicated organic compounds are combined first into simpler substances, called amino-acids, which in their turn are again united to form complex compounds, some of which have been prepared in the laboratory by synthetical reactions. In

other words, life, regarded from the stand-point of the chemist, is merely an elaborate arrangement of ordinary matter, and since Wöhler has succeeded in producing urea in a test tube, there is no reason why other synthetic proteins should not be prepared artificially from their elements. But, even so, the real problem of life cannot be solved by the chemists, for it is manifestly outside their province to determine by what laws of molecular motion we are to account for the existence of abstract qualities such as mind and thought. Viewed from this angle, the advance from the "inorganic" to the "organic" is in the nature of a "lift," bringing about new qualities and features, for "the properties of living matter distinguish it absolutely from all other kinds of things."

So with every other substantial alteration in "assemblages of matter," new qualities characterize the new entity produced. By shifting the electrons, atoms, and molecules of an organism the plan changes, just as varied patterns may be made with half a dozen counters merely by altering their positions in an orderly sequence. Thus Lloyd

Morgan is justified in concluding that "evolution in the broad sense of the term is a name we give to the comprehensive plan of sequence in all natural events. But this orderly sequence, historically viewed, appears to present, from time to time, something genuinely new. Under what I here call emergent evolution stress is laid on the incoming of the new. Salient examples are afforded in the advent of life, of mind, and of reflective thought. If nothing new emerge, if there be only regrouping of pre-existing events and nothing more, then there is no emergent evolution."

The Human Organism—This hypothesis differs from Bergson's *élan vital* inasmuch as it repudiates a purely blind creative force immanent in Nature impelling mind and matter into particular forms and attributes apart from the fitness of the environment. In the conception of Emergent Evolution the combination of certain factors results in the "emergence" of properties which are more than those which have produced them, so that a new entity is called into being coin-

ciding with a new habitat and habits of life. Thus in the case of the beginnings of man, with which we are here mainly concerned, the human organism appears to have arisen by the adoption of terrestrial life and the erect attitude coincident with the requisite growth and specialization of the brain. The new environment required certain mental and physical adaptations to enable the new creature to accommodate himself to his new conditions. This was accomplished apparently by a sudden leap over the wall separating the human from the non-human. A fresh personality with higher faculties was originated which is nothing less than a new creation—a new psychical entity with a special range of capabilities and tendencies and anatomical features, conditioned in various ways by his ancestry, yet constituting a separate individual with exceptional potentialities. Man was a new synthesis of mind, and his emergence made a new world. In short, the series of mutations that brought the human race into being was in the nature of a creative act, if by creation is

understood the making of a new species with new qualities arising out of preexisting forms.

Creative Intelligence—Moreover, he has virtually changed the whole course of evolution by his own creative intelligence, and brought about a creative rise of intellectual and spiritual characters hitherto unknown. Up to this point progress was achieved through the emergence of new sub-species, but in the kingdom of man the individual on his own initiative has influenced and changed the whole course of social development by his inventions, beliefs, inspirations, speculations, and deals. The primitive cultures examined in the last chapter bear witness to the inventive skill and adaptive power of the human mind, and if reflective thought was not very much developed at first, the practical problems of life were solved by observation and experiment. We in the Twentieth Century have entered upon an age-long inheritance of scientific knowledge and mechanical invention, and consequently we are the heirs of the experience gained throughout the long years that separate us

from our primeval ancestors, but it ill behoves us to put ourselves on pedestals as the mental superiors of those who have gone before. The truth is, we are what we are not because of what we are, but by what we have inherited, and this inheritance we owe to the inventive geniuses and original thinkers in every age. In primitive society these leaders were doubtless few in number, not because early man was mentally inferior, but because the individual was more submerged in the community than he is in civilized society. Nevertheless, men of genius did arise and were able to bring about progressive and creative mutations which have become the instruments of human achievement. Some races are superior in one direction, others in another, and the same applies to individuals. Furthermore, in estimating the creative personality of the genius, the toiling multitudes who use the products of the "creator" must not be lost sight of, for it is the combination of the "thinkers" and the "workers" that has made human society what it has proved to be—a great creative force in the universe.

Growth in Mentality—That this achievement was the result of a mutation in the direction of a great increase in the human cerebral cortex will not be disputed, however much emphasis may be laid upon other contributory factors, such as changes in anatomical structure and in the ductless glands. Man had a bigger brain, a higher intelligence, and a self and social consciousness unrealized to the same extent in his mammalian ancestors. Throughout the whole course of evolution mind has been operative, but hitherto it had been subordinate to other attributes of life. In man it became the dominant force controlling and subduing all other processes to itself. In the lower forms of life, as indeed in non-living matter, processes equivalent to those of a mental order can be detected, as scholars like Professors Whitehead and Julian Huxley allow, but they are of such low intensity and so diffuse as to be quite subordinate. With the development of the nervous system and the sense organs they gradually become intensified, specialized, and localized, and so played an increasingly prominent part in

the control of the organism, till in man they acquired the power of generalization which enabled mental associations to be made, so that not only did the mind control the body, but it was so far emancipated as to pursue its own ends without reference to their biological significance. So man became a rational being with a mental life distinct from the mere requirements of his body, having ethical ideals, a consciousness of the universe of which he was a part, and of his own history and social heritage. Thus he has been enabled to create literature, art, and the scientific method, to frame laws, developed institutions, and to arrive at some estimation of values and reality outside the domain of sense experience.

Mind and Brain—This growth in mentality is intimately connected with the development of the nervous system, though it is very difficult to determine the precise relationship between mind and brain. Since mental processes operate through the brain, which is the highest development of the nervous system regulating the living body, it is clear that function and structure must

react on one another. Therefore the activities of the two are inseparable, at any rate so far as physical processes are concerned. This may be illustrated by the mental derangements which accompany the action of alcohol, or disease of any parts of the brain. Similarly, there is no difference in structure between the human brain and that of the anthropoids, for, as Prof. Elliot Smith says, "No structure found in the brain of an ape is lacking in the human brain, and, on the other hand, the human brain reveals no formation of any sort that is not present in the brain of the gorilla or chimpanzee. . . . The only distinctive feature of the human brain is a qualitative one."

Moreover, mental evolution has kept pace with biological development in the nervous system. Herbert Spencer, in fact, attempted a thorough-going investigation of the evolution of the mind by determining the successive stages by which the nervous system increased in complexity and integration, and the moment when consciousness came into existence, and developed in intensity as the brain grew. Lloyd Morgan, on the other

hand, regards the emergence of mind and consciousness as a mutation rather than a steady growth in complexity of structure—the appearance of a new quality previously unknown, and in this sense independent of its antecedents, like the emergence of life, or of new chemical properties. On this hypothesis, the antecedents of mind in the earlier stages of organic evolution were merely crude, ineffective sensations lacking real consciousness. When the nervous system had reached the necessary stage of complexity, true consciousness emerged as the result of a creative mutation involving a new synthesis capable of memory, of striving in the present, and of looking toward the future.

This scheme has the advantage over that of Herbert Spencer in that it does not attempt to explain the higher merely in terms of the lower, to make difference of quality the equivalent of difference of complexity and structure, while at the same time avoiding any real breach in continuity. "Emergent evolution works upward from matter, through life, to consciousness which attains

in man its highest reflective or supra-reflective level. It accepts the ‘more’ at each ascending stage as that which is given, and accepts it to the full. The most subtle appreciation of the artist or the poet, the highest aspiration of the saint, are no less accepted than the blossom of the water lily, the crystalline fabric of a snowflake, or the minute structure of the atom.” Thus, while it does not interpret the higher in terms of the lower, nor denies that the final stages involve those which have preceded them and continue to coexist with them, yet it maintains that the emergents differ so completely from their antecedents as to render equally impossible the interpretation of the lower in terms of the higher. Therefore, man remains a creature apart from the rest of creation whatever be his ancestry.

Idealism—This scheme, however, is not acceptable to philosophers of the Idealist school, who think that mind transcends all “naturalism” because mind makes Nature. Therefore the problem is not “What is mind’s place in Nature?” but “What is Nature’s place in mind?” The universe, as

they view it, is an expression of mind, our own minds seeing things because they are part of the Universal Mind. But this is a theory which is unintelligible to the average scientist, and it is by no means readily conceded by the uninitiated. This may in part be due to the principles of the philosophy having been formed in the last century before biology, anthropology, and psychology had disclosed their secrets to any appreciable extent. To-day thought appears as a function of life and is intimately associated with the nervous system. It is therefore easier to think of the universe in terms of creative evolution than of creative thought. Even such abstract ethical concepts as goodness, beauty, and truth seem to be products of will and desire rather than of thought.

Now it is generally accepted that life has developed from matter, and that mind has its physical basis; but it is equally true that organic evolution is not just a mechanical process, if only because life and mind have arisen in and from matter. The universe is an organism, and not a purely physical mechanism, and room must be found in it for

life and mind. Therefore Natural Selection, if it is in any sense a really fundamental factor in evolution, as it appears to be, cannot be merely a mechanical process. This is borne out by the very important part played by psychical, emotional, and æsthetic qualities in the great struggle of males to attract to themselves females for sexual purposes. The peacock is perhaps the most striking example of the extraordinary perfection of beauty achieved through sexual selection, while power of song, scent, or general attractiveness prevails among birds, insects, and beasts, implying a corresponding sensitivity on the part of the female. Many male animals, such as stags, sea lions, and spiders, fight for a mate, but those who add to their beauty or other attractive qualities do so because the female selects her partner, sometimes after an elaborate courtship, which Julian Huxley thinks, from a careful study of the crested grebe, has the effect of establishing emotional bonds between them, so that two birds of a pair remain constant to each other.

In view of these facts it is misleading to describe the selective process merely as "the survival of the fittest" in the sense in which it is employed in the Darwinian doctrine of Natural Selection, though Darwin himself made sexual selection part of his scheme. But Natural Selection is essentially a principle of elimination of the unfit, be they benefactors or malefactors. It is a principle of death, therefore, rather than of life, and the great struggle in the animal world has been an effort to live and to promote life. Thus evolution is creative, ever producing new syntheses out of preexisting forms having new qualities and characters. This is even more apparent in the case of mind, thought itself being creative and capable of developing spiritual and moral values, as well as physical operations. The universe is neither a mental fabrication nor a mechanical structure, but a combination of the two. Philosophy and science are not really incommensurables, but two aspects of the whole truth. Structure or function alone is inadequate to solve the riddle of Nature, for it is

only by looking at evolution as an abstract whole in relation to its concrete parts that the true meaning of the process can be discerned.

In the long ascent from the atom to human intelligence innumerable syntheses have occurred, calling into being new species and qualities, including life and consciousness, as well as organic and anatomical forms. These have arisen without antecedent experience, demonstrating a creative principle in evolution. At each great advance something new has been added, till at last man dawned in the Tertiary Era as a new creation rather than as the climax of universal mind, or as an "epiphenomenon" or shadow produced by automatic variations in organic evolution. Mind and consciousness cannot be brought into the chain of natural causation by eliminating either function or structure. Something must be added to that which has gone before, not subtracted from it, to account for human intellectual, social, moral, and spiritual life. As in the case of the emergence of the molecule from the atom, and the cell from

its molecules, something new arises at each stage from the fusion of the component elements, so from complex groups of cells higher psychic or personal structures proceed. But in the mutation of life and the human mind, completely different qualities appear, entirely outside the sphere of purely mechanical processes. A machine is an instrument operated by a living agent with creative intelligence, but it does not produce of itself new forms, still less is it capable of evolving organisms conscious of their existence.

Similarly, the mere will to live can hardly initiate thought. Vital energy may account for life, but can it explain consciousness? Even the theory of "entelechy," revived and elaborated by Professor Driesch, by which a non-mechanical energy is supposed to have the power of calling forth psychical qualities, does not carry us much farther, since entelechy is actually little more than another name for an active immaterial agency comparable to "life." Therefore it does not solve the mystery of human consciousness, any more than Bergson's *élan vital*, or creative

impulse impelling mind and matter to find an outlet in fresh experiment. Nevertheless, to conceive life and mind as parts of an organism, and not of a machine, is a distinct advance on Nineteenth Century materialism. But it is now possible to go a step farther and find in *creative evolution* the true solution of the universe and man. Every distinctively new type of living creature, and indeed every new chemical compound, is a new creation in its way, inasmuch as something startlingly novel emerges which is more than an additive summation. Thus development has proceeded by a series of jumps involving physical and mental discontinuity. In man this process reaches its climax, the new synthesis being no mere mechanical or vital evolution, but a new creation still bearing in his physical structure the indelible stamp of his lowly origin, but, as the creative intelligence of Darwin perceived, equipped with a "God-like intellect, which has penetrated into the movements and constitution of the solar system," and we may add, even beyond into the heavenly realms of spiritual experience.

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Chapter VI

MAN AND HIS MAKER

IF A mechanistic interpretation of organic evolution is unsatisfactory, can we go a step farther in the direction of creative activity and find the ultimate solution of man and the universe in Spirit and a Living God? We have seen that new qualities, powers, and values have emerged with each mutation, the climax having been reached in the highest faculties of man and the spiritual values on which he has evolved human culture. Clearly he has spiritual understanding and moral consciousness in a measure entirely unknown among the animals, while life and mind, wherever we encounter them in the organic world, bear witness to new powers and qualities having been added to the primordial matter of the solar system as occasion has demanded. In short, there are indications of a moulding of the universe

both from within and from without in accordance with a preconceived, slowly maturing plan, man himself being not merely a creature of time and space, but capable of making contact with an Ultimate Reality or Infinite and Eternal Spirit from Whom all things proceed.

The Limitations of Science—At this point, however, we pass out of the domain of scientific investigation into that of philosophy and theology. The scientist claims the whole universe as his field, and his material is coextensive with the whole life of the universe, physical and mental. But he makes no attempt to teach complete knowledge in every department. Certain domains of research are manifestly outside his scope. The existence of the external world and the ultimate nature of its reality are not for him vital questions. It is not within the province of science to refer facts of experience to any ultimate reality, and it is necessarily limited in its outlook, inasmuch as it confines its attention to the methods of classification, analysis, and experiment within the sphere of sense

experience. But no one would suggest that the scientific method represents the sum total of knowledge. Thus the investigations begun by Sir Isaac Newton have led to the enunciation of the law of gravitation, which explains how every particle of matter in the universe is altering its motion with reference to every other particle, but it does not pretend to tell us why particles move in this manner, or why the earth describes a certain curve round the sun. It simply describes without explaining the routine of our perceptions which form for us the universe of gravitating matter.

But the majority of people refuse to be satisfied with the systematic descriptions which science supplies: they want to have a wider and more comprehensive view of the whole scheme of things to which they belong. They are anxious to see the whole construction, and not just the raw material, and it is the business of the philosopher and the theologian to act as architects reviewing the whole as a whole, in contradistinction to the scientist, who concentrates on the several parts. But both are needed if the edifice is

to be adequately fashioned. Without the raw material it cannot be built at all, while an architectural genius is also essential in order that the various parts may be "fitly framed together." Science tells us *how* natural phenomena have come into being and how the laws of Nature operate, but it cannot give us a transcendental reason for the meaning or value of the objects and events it describes. It has nothing to say whatever about ultimate significances, and yet cause requires to be subordinated to purpose, if facts and values are to be correlated, and both together conceived in terms of law as applicable to a world in evolution. Science, religion, and philosophy, then, should not be regarded as diverse, but analogous aspects of the search for truth, the one being concerned with facts, the others concentrating on values.

Thus, in the elucidation of human origins it is for the anthropologist to investigate and supply the most reliable data available from the actual remains of early man, and such of his handiwork as has survived the wrecks of time. This, if duly verified, the

philosopher and the theologian should make the basis of their further researches, interpreting it in terms of validity and reality, but, of course, without doing violence to the facts. Unfortunately, however, as we have seen, anthropology is handicapped by a lack of direct evidence regarding the earliest phases of human life, and its data are therefore very largely of a hypothetical nature, which at any moment may be revolutionized by new discoveries. Similarly, in the words of a recent philosophical writer, "philosophers appear to be a collection of warring partisans proceeding in different directions," and theologians are equally undecided in these matters, except in the case of those who seek refuge in dogmatic assertions regardless alike of evidence and ignorance.

Scientific Knowledge—Does it therefore follow that we must give up all hope of understanding the beginnings of man, and concentrate our attention merely on the people we can and do know? Some doubtless would agree that this is the wiser course, but there are others who believe that the present can

only really be understood in relation to the past, and for them a negative agnosticism will not suffice. Moreover, the amazing achievement of science is the result of intelligent theorizing and experimenting, tested by such facts as happen to be available at the moment. Starting from the *assumption* that Nature is in some way uniform in its operations, the whole scheme of natural causation has been developed. But this fundamental principle cannot be demonstrated or even expressed by an adequate formula, however essentially true it may be. Wireless waves, again, are merely hypothetical oscillations in an equally hypothetical ether, but their reality cannot be disputed. A scientific theory is accepted, not because it has been demonstrated, but because it provides a key for the interpretation of the facts on which it is said to be founded. As new evidence accumulates, the theory may become a demonstrated fact, as in the case of wireless waves, or it may be restated, like Dalton's Atomic Law, which is now valid only under a limited group of conditions. Finally, it may even suffer the fate of the phlogiston hy-

pothesis, and have to be abandoned altogether. But usually new knowledge only modifies scientific beliefs and gives them a fuller and deeper significance.

Thus Dalton's theory of the constitution of matter in 1804 has been very considerably amplified in the present century by the isolation of the atom and its division into a complicated constellation of positive and negative electrons, so that an element like radium is continually breaking down and liberating another element, helium. But, although it is now known that the atom is not the smallest part of matter—that of uranium, for example, consisting of no less than 99 electrons revolving in orbits round a core which is again a microcosm containing 238 hydrogen-nuclei or protons, surrounded by 146 electrons—yet the original theory is still in a sense true, though requiring adjustment to the modern notion of the nature of matter. This equally applies to Newton's formulation of the law of gravity, which has now been superseded by that of Einstein, because it explains a greater number of facts, such as the deflection of rays

of light in the region of the sun, or the relation of a tornado and the explosive expansion of heated water to the radiant energies of electricity, magnetism, and light. But Einstein has "comprehended" rather than destroyed Newton.

Science and Philosophy—These examples from other branches of scientific research suffice to show that knowledge is gained by the adoption of provisional hypotheses, often incapable of precise demonstration, but based upon duly verified evidence in process of accumulation. As new data come to hand the original conclusions are reviewed in the light of them, and adjusted accordingly. In this way our steadily increasing knowledge of human origins is being built up by the united efforts of archæologists and anthropologists, with the aid of workers in allied sciences, such as geology and comparative religion. If we are far from having reached finality, at least we have produced a more or less general outline of the beginnings of man on the structural side. Beyond this the anthropologist *qua* anthropologist cannot go. But his material gives a lead to the philoso-

pher and the theologian to interpret the facts and hypotheses in terms of function, tendencies, and ultimate reality. The danger, however, lies in the two approaches to the one problem of man becoming divorced, so that for science structure degenerates into merely mechanism, and for the philosopher function is separated altogether from the concrete sensible order of actual facts. This can be avoided by joining the process of evolution with the concept of creation.

Creator and Creation—But the notion of Emergent Evolution, like that of Bergson's *élan vital*, does not necessarily imply the existence of a Personal Creator equivalent to the later Hebrew prophets' splendid conception of one God, ethical, benevolent, the sole originator and controller of the universe. It is quite possible to accept the idea of "emergence" and "mutation" without interpreting it theologically, the whole proceeding from space-time to matter, life, and mind "so as to produce a plan," but not actually "according to plan" from without. Thus something rather like "immanent teleology" (*i.e.*, that the natural order fol-

lows a prearranged programme dwelling as it were within the substance of its organisms) might suffice by way of explanation unless it is coupled with the theological concept of creation in a definitely theistic sense. This also applies to a great deal of the philosophical idealism from Plato onward which finds refuge in the notion of the Absolute as the Power or Mind behind the universe and the cause of all things. But the God of philosophers like Berkeley and Spinoza can hardly be distinguished from an impersonal Divine Substance as the mediator of action between the mind and the body in man, and between the spiritual and the physical orders in the universe.

The Creation Narratives in the Bible—In the Bible, on the other hand, the Creator is represented as definitely Personal, Who by a series of creative acts called all things into being, making man in His own image. This stupendous proposition is set forth in a series of stories the details of which have been borrowed from the ancient folk lore of Palestine and the surrounding nations. Every nation has its picturesque speculations con-

cerning the beginnings of all things in general, and of the tribe in particular, and the Hebrews were no exception to this rule. It would seem that originally they had many crude mythologies in which primeval struggles between gods and the monsters of the deep occurred, as in the Babylonian legends. Thus there are indications that Yahweh, or Jehovah, as the God of Israel is commonly but incorrectly named, at one time was thought to engage in battle with subterranean creatures such as Rahab, Leviathan, Behemoth, the flying serpent, and the dragon (Job xxvi. 12 f., 40, 41; vii. 12; ix. 13; cf. Esd. vi. 49, 52; Isa. li. 9; xxx. 7; Ps. cxlviii. 7). But the more enlightened scribes and priests about the time of the Exile in Babylonia were inspired to write more edifying accounts of creation, without altering the current theory of the universe as a three-storied building, with the upper and lower firmaments above and below the earth. In the upper chamber dwelt Yahweh, beyond the windows of heaven, through which the water above descended, and whence He came down in bodily form to

walk on the earth and talk with the man He had fashioned from the clay.

These naïve anthropomorphisms and geocentric ideas may appear to us incongruous with our present-day notions of Deity and the universe, but in the Eighth Century B.C., when the earlier of the two creation narratives in Genesis (Gen. ii. 4-iii.; cf. xi. 1-9) was formulated, the general setting represents the current belief in Palestine about these matters. The remarkable feature of the story is creation being regarded as the work of Yahweh-Elohim alone, Who is holy, just, and transcendent. This is a great advance on the thought of the age, and reflects the influence of the Hebrew prophets of the period immediately preceding the Exile. The substratum of the Garden of Eden episode probably belongs to the ancient agricultural folk lore of Palestine, which has been overlaid by Babylonian elements, and the whole thoroughly Hebraized to explain the origin of man and woman, the marital relationship, and the beginning of clothing in connection with the sense of shame that accompanies adolescence, and

possibly also man's antipathy to serpents, together with such problems as why children are brought forth in sorrow and travail, why man must eat his bread in the sweat of his brow, the subjection of woman to man, and his relation to the animals. All these questions are answered in a fanciful and delightfully childish manner without any gross polytheistic fertility traits generally conspicuous in agricultural mythology.

The later cosmogony of Genesis i-ii. 4, drawn up by the priestly school after the Exile, is a more sober, complete, and systematized narrative, and this doubtless accounts for the numerous attempts, even in these days, to correlate it with the modern evolutionary hypothesis. Actually, however, it is based on the Babylonian creation legends set forth in the Seven Tablets, and in the bilingual legend from Nippur in Akkad. Both stories begin with a description of a primeval ocean out of which life was generated, and which was divided to form heaven and earth. Light was prior to the existence of luminaries, while the "wind that moved on the face of the waters" in the

Biblical version may be a dim reflection of the Babylonian god Marduk using wind as his weapon against Tiamat, the mother of the gods. The order of events in both more or less coincides. But although the Hebrew narrative unquestionably has a Babylonian background, the fundamental conceptions of creation and the nature and attributes of the Deity are utterly different.

Throughout the priestly story maintains a thoroughly spiritual and sane cosmogony and an ethical monotheism, in place of the fantastic, puerile, and polytheistic fancies in the Babylonian counterpart. The Deity is represented as the external, transcendent Creator of all things, visible and invisible, omniscient and omnipotent, so that all the attributes hitherto distributed among many deities are assigned to one God. Furthermore, the temptation to worship the creature rather than the Creator is removed by placing the animal creation under the domination of man. If making man in the image of God fostered an anthropomorphic conception of the Deity, it was preferable in those days to His being regarded as a

nature god, since the Semitic mind, unlike that of the Greek, was reluctant to picture to itself a human-shaped Deity, whereas the vegetation cults, with their objectionable fertility associations, proved extremely attractive.

No people so successfully reinterpreted and spiritualized their legendary history as did the Jews, making the ancient myths invaluable parables of moral and religious truth, which may reasonably be regarded as the unchanging verities respecting the nature of God and man. To mistake the stories for scientific statements of fact concerning the natural order is to do them an injustice almost as great as to deny them a place in inspired literature. As modern chemistry has discarded the old idea of phlogiston as a mysterious substance which emanated from a metal when it was burnt in air, so to-day theology has relegated the "historical" elements in the creation narratives to their proper place in literature. Like Humpty-Dumpty, Adam and Eve have had a great fall from the wall of history, and no amount of theorizing about mythical "pre-Adam-

ites" can put them together again and reinstate them in their former positions, all competent scholars being now agreed that the stories are purely allegorical. But this is not to deny their value for purposes of religion.

Science as such can tell us nothing about ultimate origins or the process of creation outside the scope of scientific definition. Anthropology is brought up shortly in tracing back the descent of man at the point where scientific analysis comes to an end. Absolute beginnings fall outside its sphere of investigation, as do the causes of the "lift" from the non-human to the human. Cause for the anthropologist *qua* anthropologist means mechanism and method, rather than purpose and validity. He can only establish a normal sequence, or tendency in the human race derived from facts about man as facts. Even philosophy does not solve the problem, because it supplies an interpretation of the facts only in terms of worth or value as an account of ultimately real existence. Philosophy is merely a way of thinking, whereas life has to be lived out. Hence, as

Doctor Marett (himself an eminent anthropologist) has truly said, "we need to move beyond philosophy to a still higher, and, in fact, the highest, plane of all. This is the plane of religion. Religion, to coin a word, is 'teleo-practical.' Its function is to supplement 'why' theoretical with 'why' practical, to convert good as described by the mere intellect into such a form of good as may be absorbed into the economy of our thinking, feeling, and willing soul-life as a whole. All sound religion is optimistic. It answers the question 'What is the good?' with an unhesitating, 'Why, all the good in the world.' Of course it looks back for support to philosophy, just as philosophy looks back to science, and science to history. But it contributes more than it receives, being the higher synthesis, the fuller interpretation, which has come 'not to destroy, but to fulfil.' Fact in detail, fact generalized, fact intellectually valued, fact vitally valued, or, in other words, harmonized with the purposes of the best attainable life—such is the ascending scale which leaves religion in

a position of highest authority, and of greatest responsibility."

The Concept of God—It is to supply a religious *motif* to creation that the Genesis narratives have been handed down to us in their present form, and therefore they are of permanent value, though the settings of the stories have long since been relegated to the realms of folk lore. Thus the priestly writer supplies an eternal truth about creation when he postulates "in the beginning God." This is the fundamental concept of religion, and takes us beyond the relative beginnings of science, or the vague metaphysical speculations of philosophy. Its precise meaning depends on the theological interpretation placed upon it, though theology is not religion, but the philosophy of religion. Religion is the life of the serious man, and its intellectual expression is bound to vary with the individual and the community, but in each and every case the supreme reality is God. Nature suggests the presence of some transcendent source of movement and change, which is strictly ex-

ternal, being above all mutability and having no succession of phase within itself; omnipotent and itself the source of all "becoming." Nature is incomplete, though governed by laws suggesting "order" and "design"—"an unmoving source of motion." Thus thinkers like Aristotle and St. Thomas Aquinas, and in our own day Prof. A. E. Taylor, have been led to postulate an "Unmoved Mover," a supernatural, intelligent, self-explanatory First Cause, to account for matter and the operations of energy and natural law.

But while we are led in this way "from Nature up to Nature's God," there is always the danger of being misled by the apparent uniformity of the laws of matter and motion, and, especially in a materialistic age, to identify God with the controller of a sort of cosmic machine, rather than as the Divine Infinite Personality Who governs all things through His omnipotent, free, purposive and creative Will. To this end we do well to approach the concept of Deity through human nature, and not through the philosophy of Nature. Man is an emergent

in the Divine plan of the universe, the highest expression of Divine creative activity of which we have knowledge, the end to which the unity behind Nature has been tending. It was he who first intuitively became aware of his Maker as a Power awful and mysterious behind the visible order, controlling its processes and manifesting Himself in extraordinary events and uncanny objects. Originally the concept of God seems to represent a psychological tendency, the climax of primitive religious emotion. Therefore it was undefined and more or less merged in the general notion of sacredness and the supernatural.

The Personality of God—But the primitive mind is incapable of abstractions, and consequently the idea of Deity was expressed concretely in terms of natural objects, and visualized in human form and assigned personality as man became aware of his own individuality. As Prof. Clement Webb has said, “the more definite ascription of personality to the object of religion will generally correspond to a fuller realization of his own personality by the worshipper.” Just

as it is only as a baby gains control over its limbs that it learns to regard them as part of itself, so doubtless man came to recognize his own personality by his ability to regulate the movements of his own members. With a fuller knowledge of human personality, and the conception of the Self in the universe, the supernatural necessarily became "personalized," and personality is ascribed to God in the highest degree of which the mind is capable of conceiving it. Even Buddhism, starting with a depreciation of personality, has only survived as another form of personal theism, while in all the great theistic faiths, Hellenic, Judaic, Zarathustrian, Christian, and Islamic, the personality of God has become most complex, and a focus of Divine attributes. In a sense, all personal theism is anthropomorphic because it corresponds to a fuller realization of the worshipper's own personality, the Hebrew monotheists being no exception to this rule.

Unlike the Greek philosophers, the prophets in Israel did not derive their ideas of God from observation and reflection upon

Nature, but they perceived behind all natural phenomena one creative, sustaining, omniscient, and omnipresent Will—that of the Living God, Yahweh, the righteous Ruler of the universe, the Creator of man. It is because this belief is deeply enshrined in the Genesis creation stories, that, despite naïve anthropomorphisms and primitive notions of the beginnings of the world and of human history, they have become the vehicles for conveying to more enlightened generations spiritual truths and fundamental religious principles above and beyond the things discoverable by scientific observation and experiment.

Hebrew Monotheism—Human genius, as we have seen, finds fresh outlet in different regions and epochs, and Palestine, at least from the Eighth Century B.C. onward, was the scene of a great religious “mutation,” initiated by the Hebrew prophets in the days of Amos, to say nothing of such seers as Moses and Elijah in earlier times.* These

* While our knowledge of the pre-prophetic period depends on traditions collected and reedited by later scribes, few scholars would now deny that the foundation of the Yahweh religion probably were laid by Moses in the desert.

men made no pretence at scholarship, as in the case of the ancient philosophers, but by virtue of their own spiritual experiences they were able not only to give utterance to monotheistic beliefs, but also to keep alive in the minority of a sorely tried nation, surrounded by polytheistic people, the purer Faith as they had received it, till at last virtually the whole community was transformed into a monotheistic kingdom. There is nothing in any of the contemporary religious developments to be compared with the Jewish conception of the One Supreme, Universal, Ethical Creator Who hears the cry of sinful man, and Who only is worthy to receive the lowly worship of His creatures. Moreover, Christianity is the climax of Hebrew religion at its best, and therefore reflects the maturity of the soul of a people who for a thousand years had been concentrated on the religious quest, and who claimed to be the object of a special Divine revelation.

The Reality of God—Is it possible that all this spiritual experience, this penetration into the world of the supernatural,

which interprets and sustains Nature while yet transcending it, is merely an illusion? Can it be that the heart of man is restless till it finds rest in pure fancy and fetish? The spiritual experience of prophets, priests, mystics, sages, alike contradicts such an assumption, to say nothing of the voice of conscience in every man. In man the natural and supernatural, the temporal and the eternal meet, but, as Baron von Hügel has said, "God is emphatically *not* our Highest Selves: heaven for us will not be a simple adequation or a simple identification (even in *kind*, apart from degree) of our nature with God's; religion is *not* a simple or full intercourse between equals." It is essentially "a gift from above downward, not a groping from below upward"; the dim searching everywhere aroused by God in the human soul being met by His coming down to us in the condescensions of historical happenings, of personal ministries, sensible stimulations, which find their fullest, richest expression in Christ.

The Incarnation—If God exists as the Sole and Supreme Creator behind Nature,

and the universe is the sphere of operation of creative evolution, there is no *a priori* objection to the further belief that He has come within His creation at a specific moment in time as an emergence of the Divine on the plane of history. The fact that life has existed on the earth for something like a hundred million years instead of some four thousand years, as the writers of the New Testament supposed, and the planet which man has inhabited for anything from half a million to a million years is but one of many worlds does not materially affect the theological issue. In this connection it has been urged that life may exist on other heavenly bodies, but as this is a pure speculation, it is idle to conjecture its theological implications, in the present state of our ignorance. But so far as the inhabited earth which we do know is concerned, whatever may have been the duration of the periods preceding the Incarnation, it was "in the fulness of time," when the great creative epoch of Jewish religious development had reached its climax by way of preparation, that "God sent forth His Son." Such an

event would necessarily inaugurate a new era—a spiritual and moral synthesis comparable to the other “turning points” we have observed in the evolutionary process.

Here, however, we are confronted with a fundamental difficulty. Can it be assumed that in Christ creative spiritual activity finds its goal and climax, inasmuch as evolution appears to be in the main a continuous upward process? Although the earth is more than a thousand million years old, apparently it is still in its infancy. In the vast regions of space there are other planets far older, and there is reason to think that we are only at the very beginning of our history as an inhabited sphere. Are we, then, justified in believing that spiritual finality was reached two thousand years ago? May it not be that development will continue till at length we reach a race of supermen, who, having passed through their troubled periods of infancy and adolescence, have at last attained to a peaceful maturity with no cares beyond the continued improvement of their mode of existence?

This alternative to the Christian view of

life seems at first to be the more probable, but on further consideration it becomes less convincing. Though our civilization has only run its course to the extent of some 6000 years or less (dating it from the discovery of agriculture), as history grows more intense and life more strenuous, can it be maintained that there is a corresponding advance in spirituality? Is it not true to say that man is daily becoming more restless and bewildered by the social structure which he has devised? Are there any real signs of an approaching social millennium, or of "a new earth wherein dwelleth righteousness"? Man is unquestionably more humane to-day than he was in former ages, but nevertheless it was principles of humanity, and not of tyranny and exploitation, that bound together the Hellenic world, the Roman Empire, and in a greater degree the Catholic Church of the Middle Ages. Happily we are now feeling our way toward the regrouping of the nations in a federation for peace instead of in treaties of war, but only after the catastrophe that befell us in 1914 revealed the destructive possibilities of

modern scientific warfare, the barbarities of which may all too easily surpass anything hitherto conceived in judicial torture and religious persecution at its very worst. Moreover, do not the best features of our present civilization take their inspiration from Christian ideals?

In Christ human nature is shown forth at its highest and best, inasmuch as history can produce no rival in the sphere of spiritual and ethical values. A long line of prophets with unique religious insight preceded Him, but He claimed to be the climax of them all, and His claim has been accredited by subsequent generations who have found in Him not only the completion of the lofty prophetic and Messianic expectations, but also the Incarnation of the Son of God and the Saviour of mankind. While He would have nothing to do with the popular notion of a national Messianic king, He represented Himself as the long-expected Christ, identifying Himself with the preëxistent supernatural Son of Man of the apocalyptic literature—the inaugurator of the new world-order which the Messiah would

reign—the Ideal Suffering Servant of the Deutero-Isaiah, and the true Messiah-King reconciling the world unto Himself, because in Him dwelt the fulness of the Godhead. In every stage of His life He was exactly what that stage required, while in His complete life He revealed, once and for all, what God essentially and eternally is, as well as what He wills His people to become. This unique self-revelation of God in human terms is summed up in the Sonship of Jesus, conscious of His complete union with the Father Who had delivered all things unto Him (St. Matt. xi. 27). Thus, as Doctor Streeter has recently said, "in Christ we are in contact with a personality of a quality which, in a sense, we may call 'absolute'; that He is not just one (not even the greatest) of a series of prophets, but, as He himself supposed, its climax." So He has drawn men and inspired them to mould their own lives on, and to develop amongst their fellows, His ideals and holy aspirations.

The Fall—Moreover, His personality is redemptive as well as creative. Conscious of His Divine Sonship, He realized that His

mission was far greater than that contained in the current Messiah concept. Nothing short of the recreation of the entire human race was the object of His coming on the plane of history, and to this end He conceived the idea of a visible Church as His Mystical Body, filling up that which was lacking in the apocalyptic kingdom of the King-Messiah, and gathering into one supernatural communion all mankind as members of a redeemed race. That, of course, implies that humanity had "sinned and come short of the glory of God." Man had somehow missed the mark and become disobedient to the higher light within, involving a death of the soul, or, in theological language, a falling away from grace. Christ, however, certainly did not represent human nature as inherently corrupt, nor did He adopt the theory subsequently set forth by St. Paul.

The Origin of Evil—Various speculations concerning the nature and origin of evil were current in Palestine at the beginning of the Christian Era, a belief in a personal and righteous God, and free will in man, neces-

sarily carrying with it the notion of a "first sin," since a benevolent Deity could not be capable of creating man inherently evil. In Genesis iii. the initial act of disobedience is represented as bringing down upon the offenders an exterior punishment, but there is no suggestion that this included a bias toward evil in Adam's descendants. On the contrary, when the problem of sin was systematically investigated by the Jews after the Exile, human wickedness was explained in relation to the strange extraneous myth concerning the "giants" or *Nephilim* of Genesis vi. 1-4, which were supposed to have resulted from an unnatural union between supernatural beings and mortal women. This interpretation is very apparent in the Book of Enoch and the apocalyptic literature generally, but, although the theory continued down to the Christian Era as a popular belief, the official Rabbinical doctrine of evil, as at the present day, was based on Genesis viii. 21 and vi. 5. But even as a popular theory the Nephilim hypothesis was unsatisfactory, because it failed to explain the continuance of sin after the flood.

Gradually another interpretation of the Fall arose, based on the assumption that the original state of the first parents of the human race was one of unfallen righteousness, till their initial act of disobedience in the Garden of Eden brought sin and death into the world as the enduring heritage of mankind. It was this theory which St. Paul used to explain the doctrine of Redemption, and under the influence of his language the early Christian writers often spoke of Adam's sin as affecting his descendants. But until St. Augustine systematized a theology of original sin in these terms, the belief was not definitely formulated even in the West, while the Eastern Orthodox Churches have always treated the subject with a "commendable, reverential vagueness." Moreover, the Western Church has never officially given its imprimatur to the Augustinian doctrine.

Redemption—So far as Christ Himself is concerned, He was content to assert that man had fallen short of the original purpose of his creation, both as an individual and as a race. The seat of sin is in the will, and not in

matter. In contrast to the rest of humanity, the Will of Christ was in perfect harmony with the Will of God, "My meat is to do the will of Him that sent me." At every stage of His life He was faced with alternatives, but being tempted in all points like as we are, He set Himself to restore the will of man to a right relationship with God through His own struggles. It was this creative Will to undo evil and its consequences that constitutes His redemptive work. If in the subconscious there is stored up the memories of our primeval experiences, as some psychologists surmise, it is possible that we start life with perverted instincts, but, in any case, we are inheritors of a social tradition that has gone wrong. In this fallen condition man could never fulfil his true vocation, and Christ, as the Image of God in human terms, revealed what man essentially is and what he can be. He was not content merely to unmake the past, but to start as it were a "new race," a regenerated humanity, to enable man to realize the purpose of his creation. He shouldered the burden of the suffering that

is caused by sin, and remade man by taking upon Himself human nature in its completeness, thereby becoming involved in "the web of evil which generations have woven," just because He has a part in those generations. God Who is the Good was crucified by evil, and out of His death life and hope spring forth eternally. Thus, in the words of Doctor Streeter, "in the Cross of Christ we catch, focussed in one vivid moment, the eternal quality of Creative Life." So St. Paul could cry triumphantly, in the language of his day, "as in Adam all die, even so in Christ shall all be made alive."

Therefore, while there may be a suggestion in the Adam story of Genesis iii., and in the Watcher legend of Genesis vi., that sin was at one time regarded as a Divine jealousy grudging man the acquisition of scientific knowledge—the "Prometheus-motif," as it has been called—there was also a deeper meaning in the allegorical eating of the tree of the knowledge of good and evil. Man as a moral being is conscious of an ethical distinction between right and wrong, and this entails moral responsibility.

So Christ represented our life here as a state of probation in which we may, if we will, move toward perfection as members of a redeemed race by accepting His offer of salvation. In short, He became "what we are, that He might make us what He is."

The Climax of Evolution—It is this remaking of man that constitutes the final triumph of the human race. Evolution is still going on, not only in the organic world, but also in the moral and spiritual sphere. In the fulness of time God sent forth His Son as an emergence of the Divine on the plane of history to inaugurate a new era by revealing the true and essential nature of humanity. In this great creative act a new development in human achievement became possible, and while Christ remains, and we venture to believe will continue to remain, the climax of human personality, being at once perfect God and true man, the upward progress of the race did not thereby cease. "For it is not yet made manifest what we shall be; we know that if He shall be made manifest, we shall be like Him." And

"everyone that hath this hope set on him purifieth himself, even as He is pure."

It would seem, then, that so far from the Christian doctrine of man being incompatible with the hypothesis of evolution, rightly understood, the two views of the human organism are complementary. The Christian need not be afraid of the evolutionary study of mankind. It is only by a careful and impartial investigation of the scientific facts regarding the emergence, progress, and retrogression of the human race during its lengthy habitation of the earth that a correct estimate can be reached concerning the history and nature of man as an organism. Clearly the scientific method is the only means by which these matters can be ascertained, and it is of fundamental importance to a right understanding of the present to arrive at as accurate an estimation of the past as is possible within the limits of the available knowledge. That this should be done in a truly scientific spirit is in the best interests of religion and truth. But natural science can pass no judgment on values or

purposes, and so the anthropologist has something to learn from the philosopher and the theologian, whose business it is to determine the ultimate causes behind the *modus operandi* of evolution, harmonizing these abstractions with higher realities, and so interpreting them in terms of spiritual, æsthetic, and moral values. It is only by taking this wider view of the human organism that its real potentialities can be discovered, and in relation to its highest and best Exponent, that a complete estimate can be formed of the beginnings of man.

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